KIC Hardware & Software Reference Guide

KIC

KIC Thermal Profiling

Process Monitoring Systems

Division of Embedded Designs, Inc.

KIC Hardware and Software Reference Guide

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WELCOME!

Congratulations! You've just purchased a thermal profiling system from the world leader in thermal profiling and thermal process monitoring. Many long hours and late nights were spent developing the products that go into these systems. Our goal is to provide you with a high-quality thermal profiling tool that is both powerful and easy to use.

At KIC Thermal Profiling, we're committed to quality and excellence in providing solutions for real-life thermal applications, and will do our best to continue to provide you with the products that meet your needs. Our promise to you is that we will be ready with systems and solutions that will keep you in control of your thermal processes. Call us anytime -- 24 hours a day (even holidays) and let us know what you need. We're here for you.

KIC Systems are designed to give maximum value and fast payback. Whether you are profiling a single oven, or networking all the thermal processing equipment in your plant, our systems can help you establish and monitor profiles that are optimum for your products.

As a Process Setup Tool, the KIC Software Can:

- Profile your products at the highest data sampling rates available, in real-time.
- Save time achieving an optimum product profile by simulating oven setpoint changes on the computer.
- Provide you with unprecedented flexibility in extracting statistical information from your profile data.

As a Process Monitoring System, the KIC software Can:

- Eliminate the need to profile, just to verify your oven is working properly.
- Virtually eliminate oven temperature related defects on all your products.
- Maintain a historical log of your oven's thermal condition, 24 hours a day.

As you can easily see, investment in a KIC System is a step towards total process control and quality management. We hope you enjoy using your KIC System and welcome any comments or suggestions.

SUMMARY OF CHANGES

As part of our commitment to constant improvement, KIC Thermal Profiling's products and methods for temperature profiling and monitoring continue to be driven by customer requests. The following is a summary of both the hardware and software changes in the 2.2 release of the KIC software.

HARDWARE

Five major and hardware changes and enhancements have been introduced:

- **New 433MHz SlimKIC-II and Thermal Receiver** – This new model of the Thermal Profiler includes a higher radio frequency transmission. If you already own a 303MHz SlimKIC, you can run both SlimKIC's simultaneously without interference. The new SlimKIC-II also features a much shorter antenna length and a Thermal Receiver housed in a much sturdier enclosure with a fixed length, coaxial mounted antenna.
- **Modified 303MHz Thermal Receiver** – In much the same fashion as the 433MHz Thermal Receiver, the 303MHz Thermal Receiver has also been redesigned and housed in a sturdier enclosure with a fixed length, coaxial mounted antenna.
- **Board Sensor System** – This value added system not only keeps track of the products that are currently inside your oven, but also keeps tracks of the total product processed. Not satisfied with just counting product, we also seized the opportunity to use the system to constantly monitor the oven's conveyor belt speed as well. As if that weren't enough, this belt speed, measured on-the-fly is further used to more finely tune the live Virtual Profile, making the subtle adjustments for the calculated belt speed which greatly affects the thermal transfer to the product.

  Contact KIC Sales for more information about this optional feature.
- **Software Key** – Often times referred to as a "dongle", this software key is attached directly to the computer's printer port to enable value added software features not normally part of the standard KIC software package.

  Contact KIC Sales for more information about this optional feature.
- **PLC Cable Option** – Ever wonder why the KIC software is alarming for an out-of-control condition but the oven is still loading product despite everything else? This cable, when attached to the same COM port used by the Prophet Thermal Manager, can send that Omni-important "cease and desist" signal to your oven's on-load workstation PLC[1] to avert such potential disasters to your product yields. Once installed and setup, the oven stops loading whenever the thermal condition of the oven is out-of-control.

  Contact KIC Sales for more information about this optional feature.

SOFTWARE VERSION 2.2

- **KICprobe Stability Alarm Limits** – Alarms can now be set based on the magnitude of temperature transitions over a user defined period of time. This

[1] Contact the OEM for your particular workstation to find out how to edit the appropriate PLC logic ladder rung to facilitate the installation of this feature.

feature is completely independent of the Virtual Profile and measures real-time temperature changes using only the raw temperature data of the KICprobe thermocouples.

Use this feature as a “Go” or “No-go” queue when determining the oven’s temperature stability prior to running a profile or processing your boards after a product changeover.

- **Maximum Deviation Warning & Alarm Limits** – In previous versions of the KIC software, the Maximum Deviation Warning & Alarm limits were defined by a single value which denoted the plus and minus tolerances of both. We’ve added the capability to define plus and minus tolerances separately which allows the user to more finely tune these allowances.
- **Function Levels and User Levels (password protection)**– You asked for it, you got it! Due to the overwhelming popularity and apparent transition of the KIC software from an Engineering tool to a complete and comprehensive process monitoring tool, KIC Thermal Profiling was inundated with requests by customers to help lessen the learning curve in an effort to more fully involve all persons in the workplace, as well as provide password protection where security was an issue.

  We’re proud to announce that we have responded to both!

  Function Levels are predefined modes of operation that allows the user to view only what they want or need to see in order to complete the task at hand, without the need for a password.

  User Levels (password protected) provides the capability to define individual users or groups of users with passwords that are assigned by the “Administrator”.

  - ✓ **Current Level** – This has been added to the Setup list menu to support changing the Function Level (no password used) or the User Level (password used) and appears for all levels.
  - ✓ **Users** – This will appear on the Setup list menu only when the Administrator is logged on and provides access for the Administrator to create individuals or groups, their passwords and their level of access. The Administer level is password protected in both the Function and User levels.
  - ✓ **Logon / Logoff** – These two features will appear on the File list menu and provide
- **Pointer Tool** – The Pointer Tool is still functionally the same as previous versions of the KIC software, but it’s operation is now more intuitive. The Pointers (still six) are now slide tabs located immediately atop the X/Y-graph. This implementation of the Pointer Tool allows you the freedom of reassigning any one of the Pointer positions after they’ve been initially set without having to reset all the Pointers.
  - ✓ **Tools/Pointers** – Turns the Pointer ON or OFF.
  - ✓ **Tools/Clear Pointers** – Clears all Pointer currently displayed
- **Auto-Predict Feature (Software Key protected)** – This value added feature adds an extreme form of clout to your busy schedule. Why spend endless hours groping for that elusive optimum profile when you can have the computer automatically do it for you in mere minutes?

  The “solutions” provided by Auto-Predict are based on the user defined limitation settings of items in the Statistics Table. Simply “describe” your statistics limits and Auto-Predict quickly calculates and assesses which oven setpoints are needed to achieve a temperature profile that falls within your limits. Within minutes, you’ll quickly find that there are often numerous solutions to achieving the optimum profile!

If you've found that you're spending entirely too much time trying to make sense of out chaos, you should seriously consider this powerful feature.

Note: To demo this feature, open the REFLOW.KOF oven sample and select "Let's Predict" from the Event Browser. From there, select the Prediction icon and choose the Auto-Predict button.

Contact KIC Sales for more information about this optional feature.

- **Live Output Feature (Software Key protected)** – Need to get the data "out" for specialized analysis purposes but copying and pasting data runs a close second to watching molasses pour? This feature enables you to automatically output the data in real-time, without the fuss of copying and pasting endless loads of data. The output can be written directly to a serial port or to a cache file on the local or network hard drives.

  Contact KIC Sales for more information about this optional feature.

- **QC-Calc™ Real-time SPC Software (Software Key protected)** – Real-time Statistical Process Control on a thermal process? (double-take) You read it right – an industry first! Used in conjunction with the Live Output Feature, it's finally possible to measure the distribution of the temperature variations inside your oven in real-time! Stop wondering how much your process capability has shifted over time and MEASURE it!

  Control Charts, *Histograms*, *Cpk Analysis*, it's all here! Every standard feature you'd expect in a SPC package is available, including a report generator that allows you create your own customized reports.

  One key feature of **QC-Calc** is the astonishing ease with which it can be setup and used in mere minutes. Input data to **QC-Calc** is literally controlled by the KIC software output, so once changes to the KIC software product recipes are made, these changes are automatically handed-off to QC-Calc as limits and other parameters with no further interaction required by the user!

  Contact KIC Sales for more information about this optional feature.

- Other minor changes
  - ✓ **Edit/Copy Product TCs** – Added a **More/Less** button to make the **Copy Product TCs** dialog less confusing.
  - ✓ **Setup/Recipe/Setpoints/Beltspeed** – Added an oven length field in minutes, which is simply calculated from the belt speed. Alternatively, the user can input a total processing time (i.e., oven length in minutes) in lieu of a belt speed and the KIC software will automatically calculate what the belt speed needs to be.
  - ✓ **Prediction Dialog Box** – The actual and predicted belt speed has been added to the top of the oven zone temperature setpoint list.
  - ✓ **Tools/Start Profile** – Will provide a means of starting a profile from the list menu.
  - ✓ **Tools/Beltspeed Check** – Will provide a means of performing a belt speed check from the list menu.
  - ✓ **Tools/Log to Text File** – The log file now includes more debugging information.

We're constantly listening to what you have to say. Please feel free to contact KIC Thermal Profiling at (619) 673-6050, or visit our web site at http://www.kicthermal.com . We're committed to listening to your ideas and suggestions!

TECHNICAL SUPPORT

TELEPHONE (USA, CANADA & MEXICO)

KIC technical support is available by phone 24 hours a day at (619)-673-6050. Office hours are from 7:00am to 5:00pm PST.

For after hours technical support leave your name and number with a brief message and an Emergency Support Technician will **be paged and return your call as soon as possible.**

FAX

You can contact us by fax for less urgent matters at (619) 673-0085.

E-MAIL

Use our E-mail to send and receive files and upgrades, or to leave any comments for future upgrades. The address is tech@kicmail.com.

BBS

Access KIC's BBS to ask questions or download the latest KIC software release. To go on-line with KIC, have your modem set to **8-N-1**, and dial (619) 673-6099.

INTERNET

Access KIC's World Wide Web Page at http://www.kicthermal.com/ to find topics that concern using KIC equipment and software and to download the latest software and manuals. To access our site via FTP use ftp://ftp.kicthermal.com/pub/ .

INTERNATIONAL SUPPORT CONTACTS

EUROPE	Telephone	Fax
USA, Canada, Mexico	1-619-673-6050	1-619-673-0085
United Kingdom	01144-1494-439786	01144-1494-526222
Germany	01149-7042-840040	01149-7042-3937
France	01133-1-6462-1454	01133-1-6462-1484
Belgium, Netherlands, Luxembourg	01132-6789-3880	01132-6722-0179
Italy	01139-3-2177-2129	01139-3-2177-2209
Spain	01134-1767-2977	01134-1767-2255
Sweden	01146-8-550-97615	01146-8-550-97598
ASIA	**Telephone**	**Fax**
Korea	01182-342-706-7680	01182-342-706-2359
Singapore, Malaysia	01165-5525-471	01165-459-6232
Indonesia	01165-5525-471	01165-459-6232
Philippines	01163-2899-6637	01163-2899-6696
Thailand	01165-552-5471	01165-459-6232
China (1)	01186-22233-9984	01186-22233-99284
China (2)	01186-21-6408-2527	01186-21-6436-1371
Hong Kong, China	01185-2296-08068	01185-2259-00305
Japan	01181-4-2623-7722	01181-4-2623-8350
Taiwan (1)	011886-2-999-3966	011886-2-999-3977
Taiwan (2)	01186-2701-5930	01186-2-999-3977
Australia, New Zealand	01161-29-790-0900	01161-29-708-3040
India (1)	01191-11-692-5190	01191-11-692-5190
India (2)	01191-124-342-677	01191-124-342-666
SOUTH AMERICA	**Telephone**	**Fax**
Brazil	01155-11-575-9494	01155-11-575-0594
MIDDLE EAST	**Telephone**	**Fax**
Israel	01197-29-790-2685	01197-29-746-0160
South Africa	01127-11-789-3230	01127-11-789-3233

BEFORE STARTING

Conventions Used

ITALIC TEXT

NOTES and TIPS are labeled as such, and are written in italics. They represent useful information concerning a particular method or procedure that does not necessarily need to be observed to accomplish the procedure.

BOLD TEXT

For the purposes of clarity, the names of dialog boxes and the labeled features within these boxes are displayed in **bold characters**.

SLIMKIC & SIDEKIC THERMAL PROFILER COMPATIBILITY ISSUES

All references to the SlimKIC Thermal Profiler and the SideKIC Thermal Profiler are synonymous throughout this document with one exception – the SideKIC Thermal Profiler is not capable of data logging or capable of facilitating a direct connection with the computer for the purposes of changing it's settings.

The SideKIC Thermal Profiler does not contain a rewriteable PROM. If you are a SideKIC Thermal Profiler user, please disregard references throughout this document to data logging or direct connection capabilities.

TIP: If you own a SideKIC Thermal Profiler but are interested in exploring the possibilities of data logging, or are interested in having a profiler with the flexibility to change data collection frequencies, please feel free to contact KIC Thermal Profiling's Sales Department for more information about this.

Terms Used

Average Deviation – As used in the KIC software, a statistic that describes the mean difference between a set of target temperatures and the current temperatures measured by the KICprobes. Also referred to as the **AD**.

Belt Speed – This is the term we'll use to refer to the oven's conveyor speed. It will sometimes be abbreviated as "BS" both in this manual and in the KIC software. It is the mechanism by which the product is moved through the oven.

Virtual Profiling – Also referred to as "VP", this term describes the ability of continuously monitor the thermal profile of a product during production through the use of computer simulation.

Desktop – This term is used to refer to user enabled settings that affect the way the main KIC software screen looks. These settings are saved with the Recipe.

Maximum Deviation – As used in the KIC Software, a statistic that refers to the KICprobe thermocouple with the greatest difference from it's target temperature, relative to the remaining KICprobe thermocouples. Also referred to as the **MD**.

Oven – The oven we refer to is generally a conveyorized machine used to introduce temperature variations in a product through the use of convection, conduction, or radiation heating methods.

Product – The "product" is the term KIC uses to denote the product that is being processed through the oven. In this manual we often use a printed circuit board (PCB or PWB) as an example, however your product can be anything from a silicon chip to a loaf of bread.

Profile Prediction – This is the phrase that describes the ability of using a baseline profile to simulate oven recipe changes on a computer.

Recipe – The "recipe" is the term used to describe what some call the "process". It refers to the combination of oven temperature setpoints and conveyor speed.

Slope – The term "slope" is a statistics used to describe the rate of temperature rise or fall over a period of time (temperature over time). A positive slope (+) is the rate of rise, a negative (-) slope is the rate of fall.

Statistics – The term "statistic" is used throughout this manual to describe thermal profile parameters that are automatically calculated. These include "time-above" , "time-between", maximum slope, and peak temperature, mean, range and standard deviation.

Thermocouple – Thermocouples are the devices with which temperature measurements are acquired by the KIC system.

Datum – A real or imaginary point, line, or surface used as a reference.

Using The Windows Operating System

Throughout this manual it is assumed that you have a basic working knowledge of the Windows™ operating system, to include the following:

- using the mouse to click and double-click
- choosing commands from the menus
- selecting buttons by clicking on them

USING THE MOUSE

If you're new to Windows and using the mouse for the first time, you may want some "hands-on" practice using the mouse or learning basic Windows skills. In the Windows Program Manager, choose Windows Tutorial from the Help menu.

TIP: If your mouse has more than one mouse button, use the left mouse button unless specifically told otherwise.

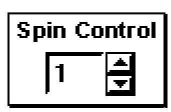
POINTING, CLICKING, AND DRAGGING

This table explains the basic terms associated with using the mouse.

To	Do this
Point	Position the pointer on an item
Click	Point to an item, and then quickly press and release the mouse button
Double-click	Point to an item, and then quickly press and release the mouse button *twice*.
Drag	Point to an item. Press and hold the mouse button as you move the mouse to a new location. Then, release the mouse button.

USING SPIN CONTROLS

You use a spin control to set a numeric property. A spin control consists of a text display and two arrow buttons.



INCREASE/DECREASE BY A SINGLE UNIT

To increase the property's value by one unit, click on the Up Arrow Button. To decrease the value by one unit, click on the Down Arrow Button.

INCREASE/DECREASE BY "SCROLLING" UNITS

To increase or decrease the value by several units or more, point at the appropriate arrow button and press and hold the primary mouse button. Release the button when you've reached the value that you want.

TIP: On a two-button mouse, the primary button is the one that you use more often. For most users, this is the left button. If you're left-handed, your buttons may be reversed, in which case the primary button would be on the right.

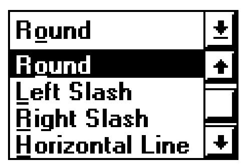
ENTERING A VALUE FROM THE KEYBOARD

To enter the property's value from the keyboard, double-click in the control's text display, then type the new value.

USING LIST BOXES

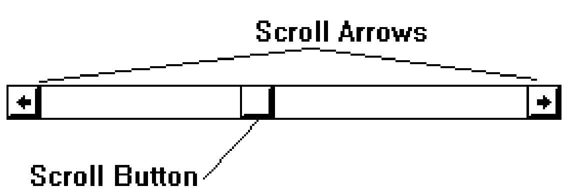
In a dialog box, a list box is a type of box that list available choices - for example, a list of files in a directory. If all the choices do not fit in the list box, there is a scroll bar. You use a list box to set a non-numeric property. To select a setting from a list box:

- Click on the box to open it, then click on the value that you want to select. If the entire list doesn't fit in the open list box, use the scroll bar to move through it.
- To access the list box from the keyboard, press <Alt> plus the underlined letter in the list box's label. You use the cursor keys and letter keys to highlight a selection. Pressing a letter key once moves to the first item that begins with that letter. Pressing it again move to the second.



USING SCROLL-BARS

A scroll bar is a bar that appears at the right and/or bottom edge of a window or list box whose contents are not completely visible. Each scroll bar contains two scroll arrows and a scroll box, which enable you to scroll through the contents of the windows or list box. Scrolls bars come in two versions, horizontal and vertical. You used them to view text or graphics that won't fit in a window, or in some cases, to adjust values.

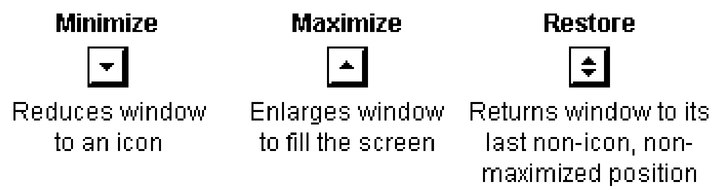


- You use a scroll bar by moving the scroll button. Point at the scroll button with the mouse, press the primary mouse button, and drag the button in the direction you want to go.

- You can also move the scroll button by clicking on either side of it, or by clicking on the arrow buttons at either end of the scrollbar.

MINIMIZE, MAXIMIZE AND RESTORE

To minimize, maximize, or restore the Main Window or an Oven Window, use the Positioning Buttons. The positioning buttons appear at the right end of the windows title bar. You can toggle back and forth between the maximized and normal states by double-clicking on the text display section of a window's title bar.



RE-SIZING A WINDOW

To change the size of the Main Window or an Oven Window:

- Point at a side or corner of the windows. The cursor will change to a double-headed arrow.
- Press and hold the primary mouse button.
- Resize the window by moving the mouse.
- Release the mouse button.

USING THE CTRL KEY

You can choose some commands by pressing the shortcut keys listed on the menu to the shortcut keys listed on the menu to the right of the command. For example, to open an oven file, press CTRL+O.

USING THE ATL KEY

You can choose other commands by pressing the shortcut key annotated by a line under one character of the command on the menu. These commands are accessed by holding the ALT key. For example, to open the KIC software's Hardware Input Monitor, press ALT+S+H.

Shortcut keys are handy once you've become familiar with the menu structure in the KIC software. To really access all the power of the KIC software however, you need to use a mouse.

General Precautions

KIC systems and components are built for use. Using normal precautions in handling is all that is typically required to keep your system on-line indefinitely. Most safety tips are simply common sense, but bear repeating.

The most important thing to remember when using KIC products is that they are designed for use at high temperatures which in turn are typically produced by high electric voltages and currents. In addition to the obvious cautions about handling thermally hot items, you must also be aware of possible electrically hot encounters.

Exercise reasonable care in all KICprobe installations, removals and replacements to avoid contact with bare wires or other electrically live parts of the oven, and always observe proper lock-out/tag-out procedures applicable for your area. Refer to the oven manufacturer's specific cautions and warnings regarding removal of panels or access doors.

The first and most important rule for anyone installing KICprobes is to never install KICprobes in an oven or furnace with open face heating elements. Open face heating elements are the types where the wire carrying the heating current is exposed to the product being heated.

A good example of this type of oven is a common toaster for toasting bread. We are all aware of the dangers of putting a knife into the toaster. For the same reasons you should never put the metallic KICprobe into an oven built this way.

Never send a SideKIC or SlimKIC into an oven before first assuring that it will not touch any live wiring inside. This is especially true if the thermal shield is not being used.

KICBOARD AND QUICK-KIC CARD HANDLING

Make sure that the power to the computer is OFF before inserting or removing a KICboard or Quick-KIC Thermal Recorder board. Be careful not to inadvertently change the settings of the SPAN and LINEARITY potentiometers on the top of these boards, particularly when sliding the top cover back onto the computer.

Whenever working with these boards or inside the TPU, ensure that you are correctly grounded. Use a grounding wrist-strap and cable if available. If none is available, always touch the chassis of the TPU prior to touching any component on the motherboard, or the chassis of the computer prior to handling the KICboard or Quick-KIC Thermal Recorder board.

Always handle the boards by their edges. Observing these precautions can help prevent electrostatic discharge (ESD) damage from occurring on your equipment.

Be sure to tighten the KICprobe mounting screws after mating the connectors. In some cases, the traveler connector may have one of the mounting tabs cut off to facilitate installation on some IBM compatible MicroChannel computer

THERMAL PROFILING PRIMER

Welcome to the leading edge of thermal profiling! What exactly is it that KIC Thermal Profiling provides that sets it apart from the rest? Simply put, we provide the solutions needed to control your thermal process. In today's highly competitive markets, you need a reliable system that you can depend on to provide you with the information needed to control your product quality – your competitive edge.

We go far beyond, the current standard of just collecting product temperature data. We provide you, the customer, with the methodologies needed to continuously acquire, assimilate and analyze your thermal processes performance.

You're now on your way to complete process control. Our systems have been providing a solid foundation for implementing comprehensive quality control throughout thermal processes since 1977.

The powerful capabilities of the Prophet Thermal Manager will enable you to respond to the increased demands for higher production yields and continuous quality improvement.

Note: While the Prophet Thermal Manager system is applicable to most conveyorized thermal processes, throughout this document we'll use the soldering of printed circuit board assemblies in the electronics industry as an example to help explain our products.

One of the greatest issues facing electronic manufacturers is the initial setup and continued control of the solder reflow process in order to obtain the optimal process yield. To achieve high quality solder joints, all the variables regarding the solder reflow process must be controlled.

Understanding how the modern solder reflow oven works and the basic principles of conveyorized heat treatment can ease the job of oven setup, i.e., "thermal profiling".

What is a Thermal Profile?

Although the presentation of a thermal profile has many variations, in it's simplest form, the temperature data is plotted along the Y-axis of a graph, and time is plotted along the X-axis. When the points created along this graph are sequentially connected, what results is a "picture", or a thermal profile of how the temperature changed during that time span.

The reasons and methods for product profiling and thermal process monitoring are basically the same for all industries. Whenever manufacturing a product requires a heat processing step, there must be some method to monitor that step to ensure that the product is seeing the proper processing temperature at all times.

Methods may vary, but the reason remains the same. In the electronics industry when somebody says "I will profile the oven", what they mean is that they are going to record the thermal profile at different points on the product, as the product travels through the oven.

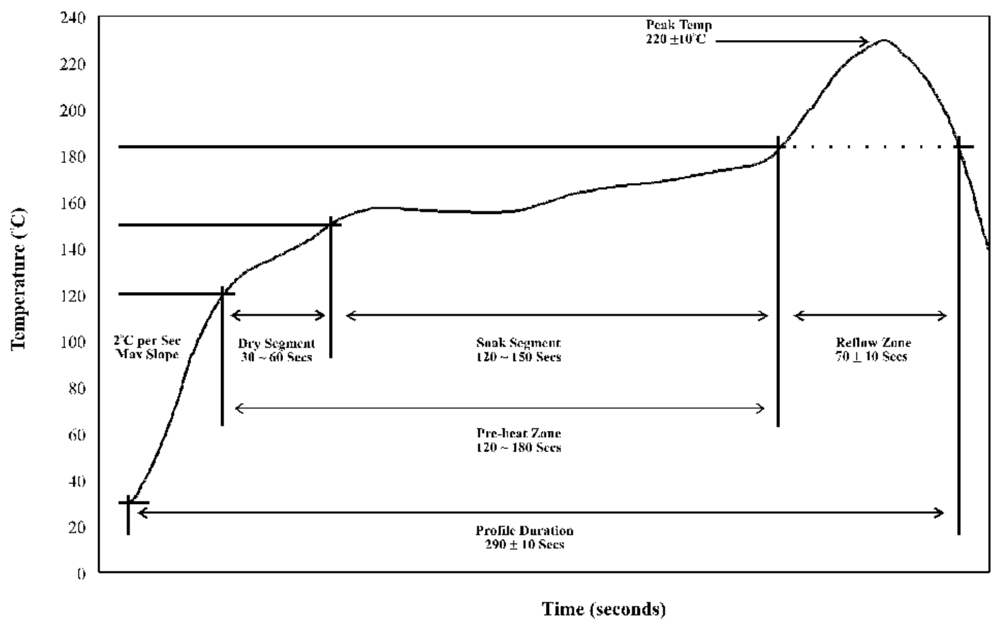
Thermal Profiling is a method of measuring temperature over time. It's an analysis tool that's been used by the engineering community in various disciplines for many years. Thermal Profiling serves the following purposes:

- **Process Setup** – First, thermal profiling is a setup tool that enables the engineer to establish the baseline of their process. Examples of using thermal profiling to establish a baseline are:

- ✓ Oven characterization
- ✓ Process capability studies
- ✓ Materials qualification
- ✓ Product qualification

- **Process Monitoring** – Additionally, thermal profiling is used as an SPC tool to monitor process variation. When the variations can be controlled, process repeatability is accomplished, production yield is improved, and product rework costs are reduced.
- **Process Improvement –** Finally, thermal profiling can be an invaluable aid in helping to determine potential areas of improvement in thermal processing. Everything from thermal profile optimization, to improved preventative maintenance frequencies can be accomplished with the aid of this information.

Simply put, thermal profiling is a tool used to establish, monitor, and improve thermal processes.



A typical temperature profile specification for a surface mount technology process

Principles of Thermal Profiling

In a typical solder reflow oven, the product enters one end of the oven and moves at a constant speed through a series of temperature controlled zones. Thermal profiling is the process of plotting temperature vs. time of the printed circuit board as it travels through the oven. The thermal profile of the product is determined by:

- Temperature
- Time
- Heat Transfer Rate

Temperature is measured by attaching thermocouples to different areas on the product. The thermocouples are positioned on the product to find the highest and lowest peak temperatures.

The highest peak temperature is typically found near it's bare edges and the lowest peak is found at larger components, near the center of the product. 30 AWG thermocouple grade wires are used. They are attached to the product via high temperature solder or, in the absence of solder joints, thermally conductive adhesive.

TEMPERATURE

Two important laws of physics relate the temperature along the oven conveyor to the temperature of the product:

- At a given point in the oven: If the oven temperature is above the product temperature, the product temperature will rise. If the oven temperature is below the product temperature, the product temperature will fall. If the oven and product temperatures are the same, the product temperature will not change.
- The greater the difference between the oven temperature and the product temperature, the faster the product temperature will change.

TIME

The time that the product is subjected to a given oven temperature can be changed by varying the speed of the conveyor. The slower the conveyor speed, the more time the product will have to reach equilibrium with the actual oven profile.

In theory, if the conveyor were to move infinitely slow, the product profile would match the oven profile. In practice, there are many conveyor oven processes where the conveyor speeds are so slow that the oven profile is used to approximate the product profile.

In the electronics industry, such processes include thick-film resistor firing and silver glass die attach.

HEAT TRANSFER RATE

The "heat transfer rate" is a measure of how quickly heat is transferred from the oven to the product. The greater the heat transfer rate, the lower the oven temperature required to raise the temperature of a given product, a given amount, in a given time.

In solder reflow, as the size and complexity of the printed circuit board increases, and the component density becomes less evenly distributed, ovens with a relatively low heat transfer rate begin experiencing problems.

These ovens, often with "panel IR" or "bulb IR" heaters, tend to overheat the low thermal mass areas of the printed circuit board in order to insure adequate reflow of the more thermally massive components.

Many of the newer "forced convection" oven designs boast a more efficient heating system with a higher heat transfer rate.

Temperature Profiling in Real Time

Real-time systems require direct connection in one form or another to a computer. The benefit of real-time is that you see the temperature profile as the product is moving through the oven.

Seeing the data immediately can eliminate wasted time profiling if a thermocouple is broken, and can also prevent over heating the test product.

Strip-Chart Recorders

The Strip-Chart Recorder was the first true profiler. The early models could only plot one thermocouple at a time. The thermocouple would attach to the product and a long wire trailed behind as the product moved through the oven.

Specially marked paper moved through the Strip-Chart recorder at a preset speed and a pen moved up and down depending on the thermocouple temperature. The profile appeared on the paper in real-time as the product moved through the oven.

As with all older technology, these devices appear crude today, but in their time, they were the best way to see the product profile.

The Quick-KIC Thermal Recorder

The Quick-KIC Thermal Recorder provides a single trailing wire that has inputs for as many as 6 thermocouples. Instead of a simple paper printout, the profile is displayed in color on a PC monitor.

The Quick-KIC Thermal Recorder board is plugged into the PC and the KIC TC Extension is connected to the Quick-KIC Thermal Recorder's board.

When the product exits the process, the product thermocouples are unplugged from the KIC TC Extension and the cable is dragged back through the process. With the Quick-KIC Thermal Recorder it's difficult to profile an oven during production.

As you can imagine, the trailing wire makes it difficult to place product on the conveyor behind the product being profiled.

Data Loggers

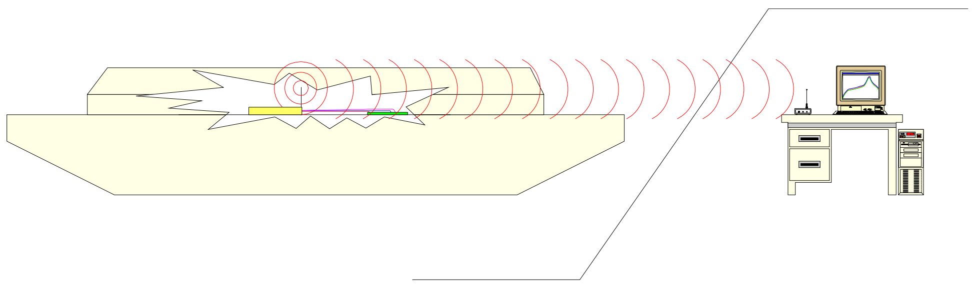
To eliminate the trailing wire and allow processes to be profiled during production, the SlimKIC Data Logger was invented. This SlimKIC Data Logger accepts from 3 to 12 thermocouples and runs through the process behind the sample product. As it runs through the process it stores the temperature profile information inside it's internal RAM.

Once the SlimKIC Data Logger has emerged from the process, it is taken to a PC, plugged into an RS-232 COM port, and the temperature data is downloaded. Data Loggers revolutionized the electronics assembly industry by allowing the product profile of any process to be quickly and easily verified.

While it is nice not to have to have a PC on the shop floor, the SlimKIC Data Logger had a big disadvantage in that it does not show the product temperature in real-time. Since most solder reflow ovens do not have a window that allow you to watch the product, if the product and the Data Logger fall off the conveyor or somehow became lodged inside the oven, you could easily lose them both.

The SlimKIC & SideKIC Thermal Profilers

KIC Thermal Profiling developed a data acquisition transmitter, called the SlimKIC Thermal Profiler, that transmits it's information directly to a receiver (called a Thermal Receiver) connected to the computer's communications port. With live data being transmitted directly to the computer, the progress of the profile could now be observed on the screen as it happened, real-time, much like that of a strip chart recorder.



Using the SlimKIC, you can quickly increase your line's productivity simply by decreasing the equipment downtime once needed to perform this labor intensive task. Since the SlimKIC can be used in conjunction with an actual production run, there is no need to stop the production flow simply to check or monitor the profile.

The SlimKIC Thermal Profiler is basically a data logger with a radio transmitter. The transmitter sends temperature data back to the Thermal Receiver as it is sensed. The Thermal Receiver is attached to the user's PC, where the temperature data is shown in real-time on the monitor.

The SlimKIC Thermal Profiler was developed to combine both the convenience and flexibility of the SlimKIC Thermal Profiler's data-logging with the safety and immediate response of the real-time Quick-KIC Thermal Recorder.

There is a SlimKIC model that combines both real-time data transmission and data logging capabilities. The Transmitter/Data Logger features of the SlimKIC Thermal Profiler can be used in either mode, or both modes simultaneously. It offers the benefit of both styles of profiler and is typically selected when the user has changing needs that require both real-time and data downloading.

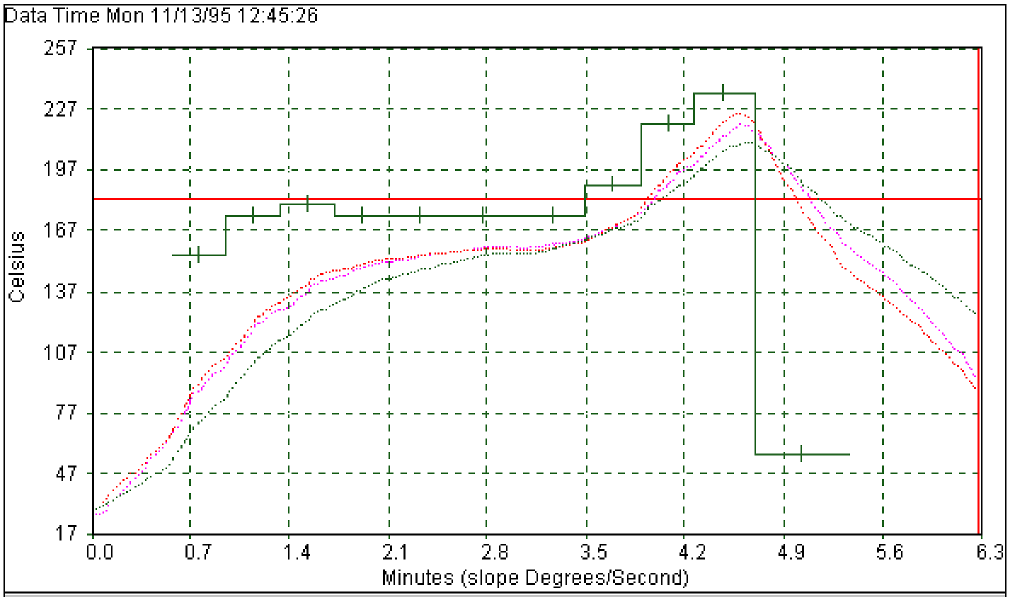
What is Profile "Prediction"?

The KIC software introduces the power of computer simulation as a tool in assessing the oven's thermal "behavior", and predicting the reaction of the thermal profile whenever an oven zone setpoint or conveyor speed is changed. This is called *Profile Prediction*.

Using past profile information and a known oven setup to formulate the reference point for a mathematical model, the user simply makes changes to any part of the oven setup on the computer (rather than the oven) and is presented with the predicted profile.

With Profile Prediction, you'll accomplish in less time what used to take Process and Research & Development engineers hours of painstaking trial and error to perform.

Profile Prediction can be employed through the use of our Prophet Thermal Manager, or just a standalone SlimKIC or Side Thermal Profiler.



	Peak	Max Rising Slope	Total Time Above 183
1 U8B1	219.4	2.14	64.36
3 BOARD	225.2 +	2.37	60.52
5 U2G1	210.4 -	1.78	62.27
TC Range	14.8	0.59	3.83
Predicted[01] U8B1	219.4	2.06	65.55
Predicted[03] BOARD	224.7	2.30	62.31
Predicted[05] U2G1	211.2	1.76	66.55
Range	13.6	0.54	4.24
KIC Probes	233.7		

What is Auto-Predict?

As part of our commitment to continuous improvement, KIC Thermal Profiling has taken the power of Profile Prediction to higher levels, offering tools that can

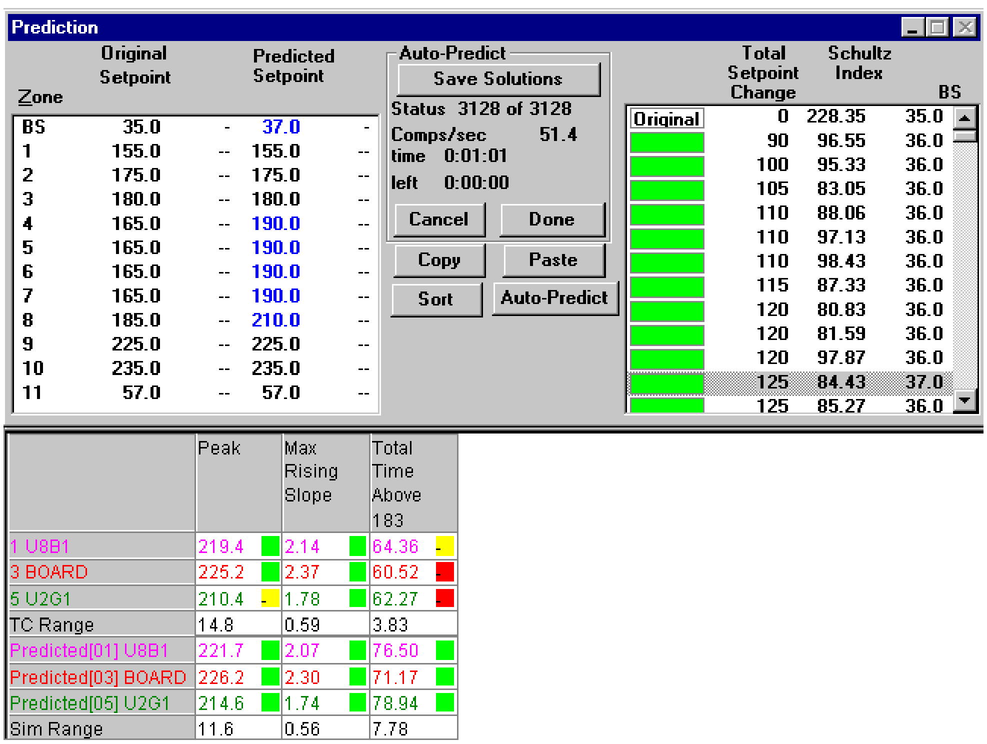
completely automate the discovery of the oven setpoints that match your actual temperature profile to your process specifications.

Through the use of Profile Prediction the time required to find the right profile for your product was significantly decreased over trial and error methods. However, with **Auto-Predict**, the time required has been dramatically reduced even further while the oven setpoint combinations that met your product profile specifications have been maximized.

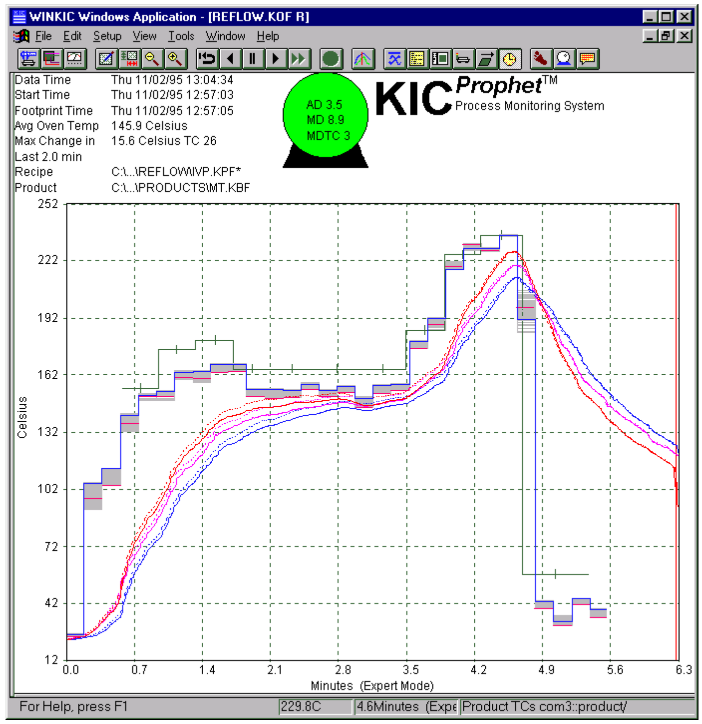
The user defined Statistics Table limits are used to determine what an acceptable profile is. When the statistics for the Predicted thermocouples are all green, Auto-Predict has discovered “a” combination of temperatures and/or belt speeds that will provide the temperature profile required to the specification. As you can see, there are often times many possibilities.

Up to 70 solutions per second can be calculated on a fast computer. A solution is equivalent to performing one manual setpoint change using the standard Profile Prediction method. This means that over 50,000 possible profiles can quickly be resolved and the results compared to the statistics limits assigned by the user in under 12 minutes time.

Note: On average, these same 50,000 combinations would have taken a little over 2 weeks of continuous effort to accomplish using the standard Profile Prediction method. Using the old fashioned trial and error method would take about 3 years to perform.



What is Virtual Profiling?



ISO-9000 registration requires that a manufacturer's processes be regularly monitored and statistically documented by process, product and date. The methods used to monitor and document are up to the manufacturer.

In the electronics industry, most conveyor ovens are made up of a series of temperature controlled zones. Each zone has a control thermocouple whose temperature is displayed on the oven control screen.

Because the zone control thermocouples are closer to the heat source than they are to the conveyor, and because the zone control thermocouples are part of the oven control loop, manufacturers are aware that the product thermal profile may vary even though the zone control thermocouple temperature does not.

In order to monitor this process variation, the process thermal profiles are "sampled" on a regular basis by running a test assembly throughout the process with a device such as the SlimKIC.

Typically the SlimKIC Thermal Profiler is run once a week, once a day, or as often as once a shift. However, when a quality problem is detected, every product produced since the previous profile is suspect.

Also, if the thermal process has an intermittent problem, sampling the profile may never find it. If an inexpensive and easy way was available to monitor the process thermal profile continuously, it would certainly be the method of choice to quality oriented manufacturers.

One of the significant advances that KIC Thermal Profiling has achieved in thermal profiling is *Virtual Profiling*, or *VP*. This "virtual" profile was created when the KIC software measured the deviation (difference) between the current KICprobe temperatures and the temperatures of the KICprobes at the start of the most recent thermal profile.

This feature allows monitoring of your product's profile 24 hours a day. Your current method of in-process quality check may include sampling the product once a shift. Virtual Profiling samples the profile continuously.

Much like Profile Prediction, a mathematical model is created from an actual profile. This model is then used by the KIC software to describe how temperature changes

detected at the KICprobe thermocouples correspond to changes in the profile of the product.

As the KIC software detects the changes in the KICprobes, your product's profile is changed in real-time on the computer screen. It's like having thermocouples attached to each and every product that's processed through your oven.

Virtual Profiling acts as a 24 hour watch-dog, guarding your product from problems associated with thermal process deviations. User definable boundaries provide total control over temperature variation allowances.

When problems with your thermal process such as gas flow changes, control thermocouple drift, fan failure, etc., crop up, the KIC software will "warn" you of these developments long before any of your product is affected.

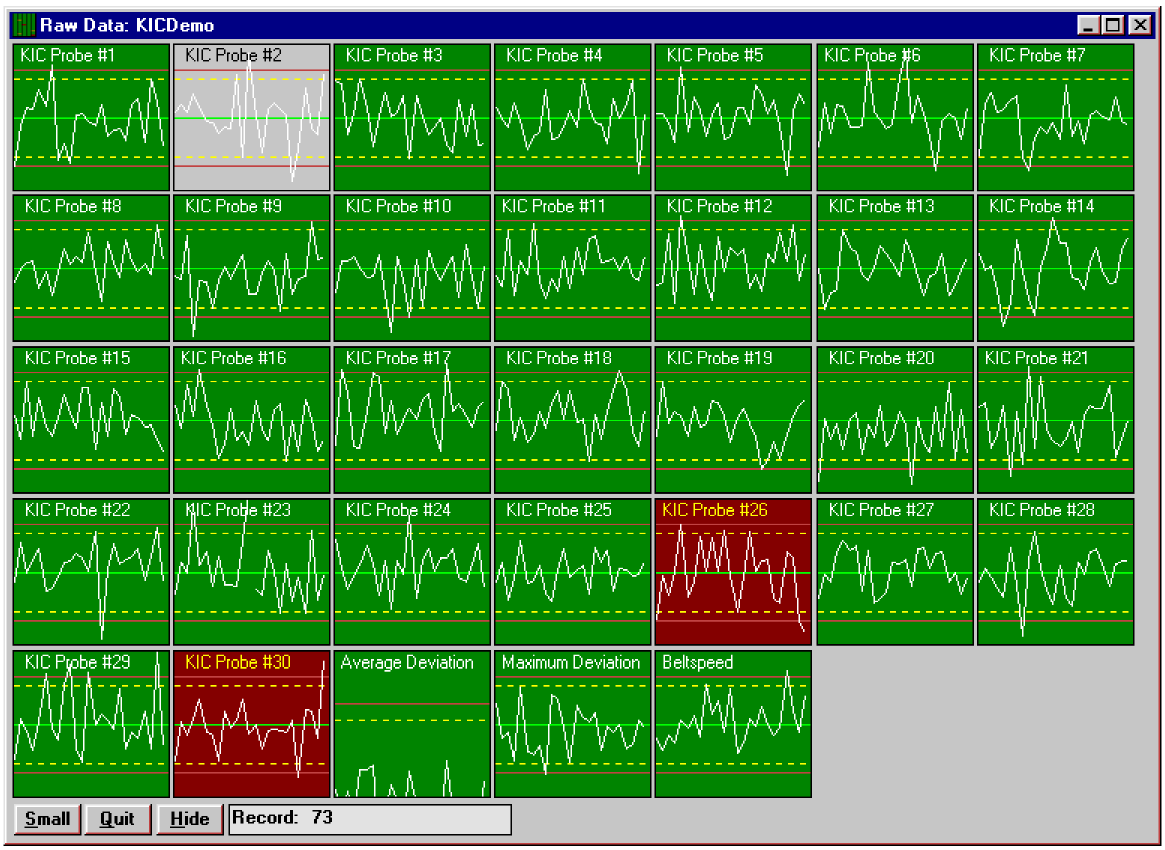
The KIC software also continuously records this information into a *History File* that provides documented evidence of the oven's condition, all the time.

Statistical Process Control

If you are interested in real-time Statistical Process Control, an automated data collection option called **QC-Calc™** is available to meet your needs. QC-Calc is a comprehensive SPC program that automatically collects, manages, analyzes, and reports your temperature data. By implementing QC-Calc with your KIC system, you can identify and isolate out-of-conformance conditions throughout the oven. With QC-Calc, you can precisely manage your product quality.

Setup information such as measurement nominals, tolerances, data trigger sources, and barcode numbers are automatically extracted from the output information sent by the KIC software. This data is displayed on the screen as real-time X-Bar plots.

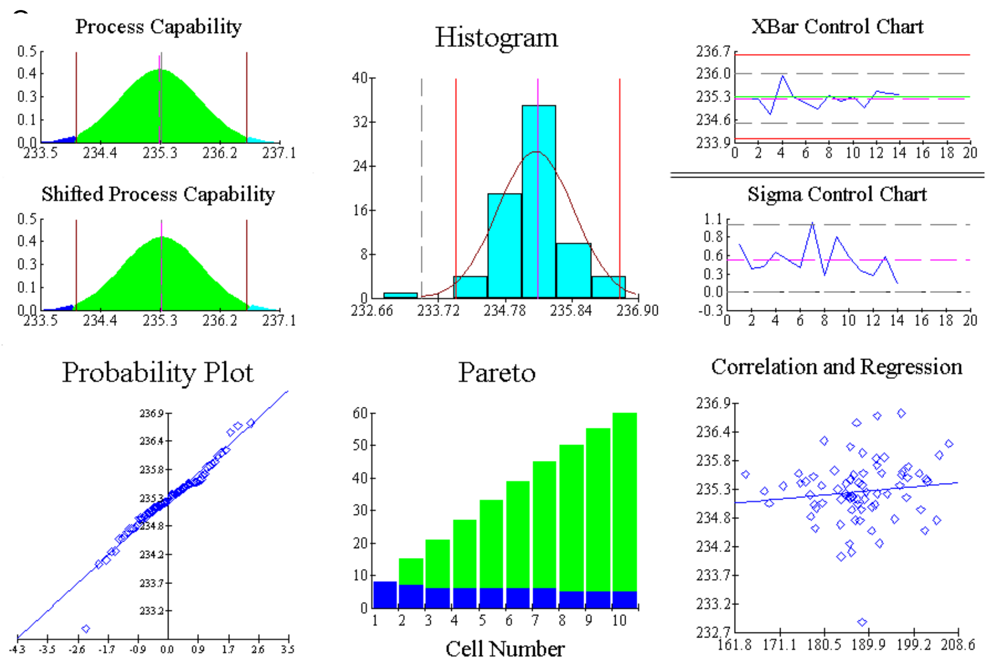
Once the data is collected, QC-Calc can perform all of the standard SPC analyses. You can easily manipulate data by adding, changing, or deleting. The data can be imported or exported to other software programs. You can work with all stored data or with a subset. Using filters, you can extract data which matches specific criteria for use in editing, ASCII file conversion and printing, reporting, or SPC analysis.



SPC ANALYSIS

To analyze measurement results, you simply exit the real-time inspection portion of the program and use QC-Calc historical analysis charts, which include:

X Bar & Range	Individual & Moving Range	Probability Plots
X Bar & Sigma	Process Capability (Cpk)	Histogram Analysis
Median & Range	Raw Data with Outlier ID	Stat Summary Reports
Moving Average & Range	Pareto Analysis	First Article Reports
Individual & Range	Correlation & Regression	Gage Repeatability



Traceability Systems

Optional equipment is available for your KIC system that provides the means of counting and tracking your product throughout your thermal process. These devices come in two different categories:

- **Barcode Readers**
- **Board Sensors**

Many of today's quality standards encourage, or outright require the implementation of techniques and methodologies that provide a means of tracing the product from the point of raw material to it's shipment to the customer, all processes in-between inclusive.

Traceability criteria instill a form of integrity and accountability in the overall quality of the product, as well as a means of analyzing and improving the process. The benefits of implementing taceability systems can be realized by <u>both</u> the customer as well as the manufacturer.

Traceability serves to isolate and contain product discrepancies or field failures and can minimize the amount of time required to identify the scope with which all product is affected.

Furthermore, the capability of isolating only the affected product can help minimize superfluous data (i.e., data from product not involved affected) from the engineering investigation process, thus improving the confidence of the outcome when the root-cause of the failure is discovered and a corrective action is taken.

BARCODE READERS

Barcode readers are tried and proven method of tracking almost any type of product throughout all it's processes.

KIC THERMAL PROFILING

When employed on a KIC system, these barcode numbers are automatically read directly from the product labels and the information passed to the computer via a dedicated COM port. This information is then logged into the Event Browser of the KIC software, complete with the date and time it was scanned by the reader. This process is performed in just milliseconds.

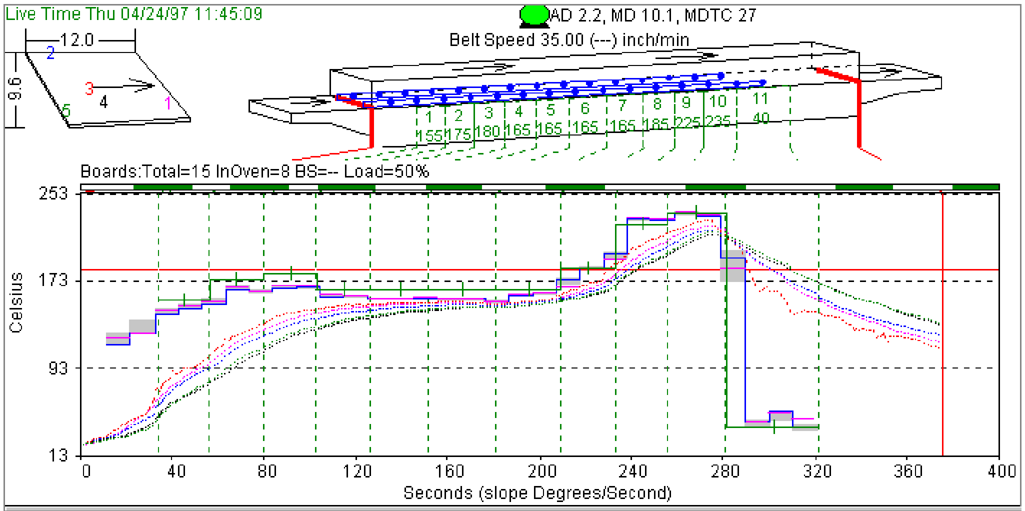
These barcode numbers have now become a traceable record providing invaluable evidence of the thermal condition of the oven when the product was processed. It can quickly be recalled at any time through the use of search tools provided on the Event Browser, then examined and scrutinized directly within the KIC software using the various analysis tools provided.

BOARD SENSORS

The Prophet Thermal Manager can support the use of Board Sensors used to count and track the quantity of boards inside the oven, as well as totalize the quantity of boards passed through the oven over a given time or run.

All ovens have a limit to which they can take on product before their control systems can no longer support the heating capacity required to maintain either stable temperatures or the temperature profile required to meet your process specifications.

Unfortunately, oven loading is a process standard which is oftentimes not considered by many process engineers – or simply ignored by those required to monitor the process. The results of uneven or out-of-control oven loading can prove disastrous, propagating itself in the form of extensive and non-value added rework, reduced turnaround times, or outright rejection and discarding of the questionable product. Oven loading needs to be determined and it's limitations respected.



	Peak	Max Rising Slope	Total Time Above 183
IVP[01] U9L1	223.8	2.44	65.12
IVP[02] U1C1	219.2	2.63	62.46
IVP[03] Board @ BT6E1	228.8	3.65	62.11
IVP[04] U7E1	215.4	2.25	67.10
IVP[05] U9A1	217.5	2.28	68.39
Sim Range	13.4	1.40	6.28

A typical means of ensuring that the oven loading is even involves the standardization of the spacing, or gap, between each of the products being loaded. More common is an automated method by which the on-load workstation at the oven's entrance employs the use of a simple timer, either operator set or maintained in the workstations Programmable Logic Controller.

Because the heat transfer rate of a conveyorized oven is greatly affected by this loading capacity, Board Sensors can be employed as a means of continuously monitoring and recording the load condition in real-time. This information is collected and sent to the KIC software where it is displayed, stored and maintained.

Using the KIC software's Event Browser, you can effortlessly slew to the date and time in question to more closely examine the oven's loading condition, which is represented as a percentage of the oven's total capacity.

HARDWARE SECTION

Computer Setup Requirements

To achieve the full benefits of the Prophet Thermal Manager, it is important to understand that it's performance is limited to the capability of the computer system on which it is used with.

Powerful computer algorithms and floating point mathematics are employed to achieve the results derived from the data collected by the KIC system. In order to facilitate this level of functionality requires the use of a computer system with the right hardware to support it.

Please read and adhere to the minimum standards that follow. Deviation from these standards can potentially reduce the overall performance of the system, or cause it not to work at all.

CPU REQUIREMENTS

When using the Prophet Thermal Manager, a Pentium™ class computer must be used.

When using just a SlimKIC, SideKIC or Quick-KIC card, a 486DX 33MHz will work with the following exception:

- If using the Auto Predict feature of the KIC software, a Pentium™ class computer must be used.

MEMORY REQUIREMENTS

Under all conditions, a minimum of 8 megabytes of random access memory (RAM) must be installed in the computer, with the following exception:

- If the KIC software will be operating in conjunction with another application (i.e., such as an oven controller or SPC application) then a minimum of 16 megabytes of RAM must be installed.

COMPUTER PORT REQUIREMENTS

A computer has serial and parallel ports with which external devices are used to perform certain functions. The serial port (COM port) is commonly used as a means of connecting a computer mouse, external modems or, in the case of a KIC system, data acquisition devices.

The parallel port is commonly used and dedicated to the computer's printer. If optional features are included with your KIC system, a software key may be included that is attached to this port, in-line with the printer cable.

At least one free COM port must be available to allow the KIC system to communicate with the computer.

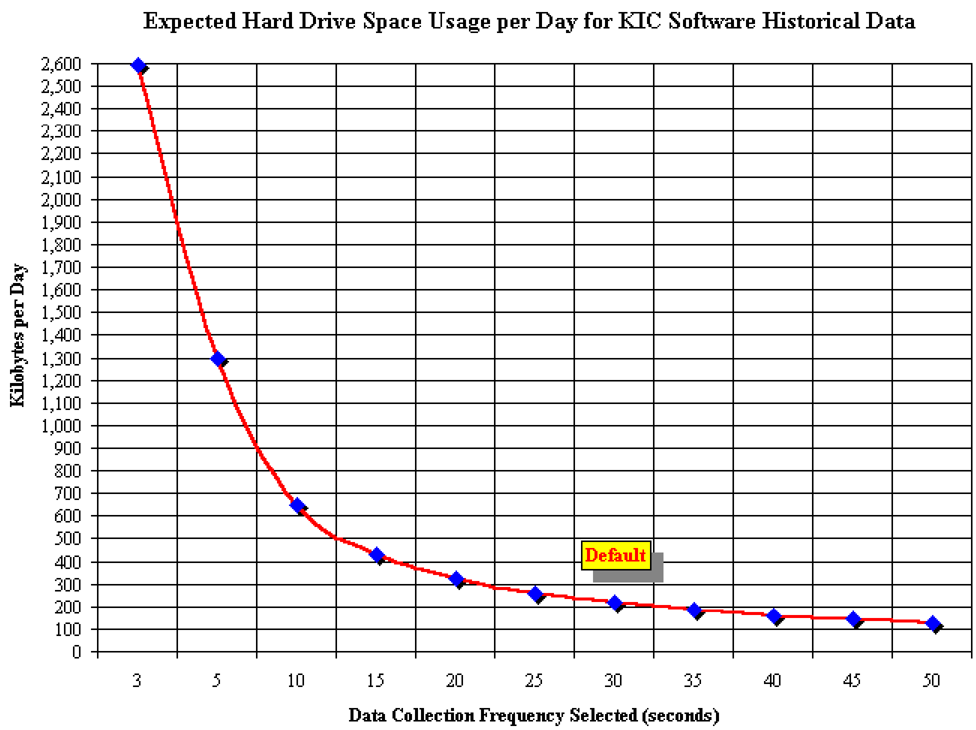
If the barcode reader option will be used, at least one[2] additional COM port must be available per barcode reader.

If you will be using Auto Predict, Live Data Output, or the QC-Calc SPC package, a parallel printer port must be present to facilitate the use of the software key that activates those features.

DRIVE REQUIREMENTS

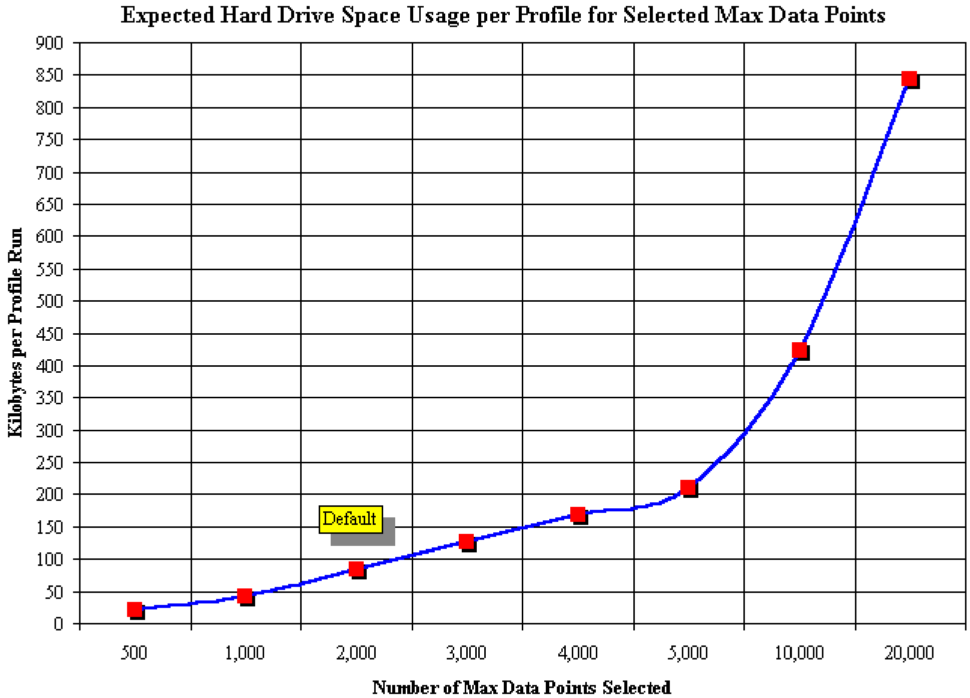
At least one 1.44Mb floppy drive must be installed. A hard drive with 10 megabytes free for the KIC software installation and at least 100 megabytes available to collect profile and monitoring data.

We strongly recommend at least a 500 megabyte hard drive in order to support this hard drive memory availability.



Estimated hard drive capacity requirements based on the KICprobe data collection frequency.

[2] Some barcode reader manufacturers allow 2 or more devices on a single COM port. Contact your barcode reader OEM for information about this feature.



Estimated hard drive capacity requirements based on the number of data points that will be used per thermocouple, per profile.

MONITOR REQUIREMENTS

The minimum resolution that is actively support by KIC Technical Support is 800x600x256 colors and above (i.e., super VGA). If your computer only supports standard VGA or EGA, you may need to upgrade the video card and possibly the monitor itself.

Note: Although the KIC software will operate using a standard VGA monitor resolution, the use of the software is severely hampered by doing so.

OPERATING SYSTEMS SUPPORTED

Throughout the software and hardware development cycles, KIC Thermal Profiling makes every effort to ensure compatibility with targeted operating systems.

However, experience has shown that many operating systems used in the manufacturing environment are usually prone to using operating system that are somewhat dated. KIC Thermal Profiling continues to support these operating systems to a limited degree.

The following are the operating systems currently supported:

- **DOS 5.0 and above** – unlimited support for the DOS-KIC application only.
- **Windows 3.1** – unlimited support for all versions of the KIC software
- **Windows for Workgroups 3.11** – unlimited support for all versions of the KIC software

  Note: In Windows 3.1 and 3.11 the AUTOEXEC.BAT file must include the following line: **C:\DOS\SHARE.EXE /L:500 /F:3000**

- **Windows 95** – unlimited support for all versions of the KIC software
- **Windows NT** – unlimited support for all versions of the KIC software
- **OS/2** – limited support for all versions of the KIC software

Other Devices Recommended

MOUSE OR ROLLER-BALL

Although it is possible to operate the Windows version of the KIC software without a pointing device (such as a mouse or a roller-ball) through the use of quick-keystrokes, it is not recommended.

Microsoft Windows for Pen computing and “touch-screens” type monitors are not actively supported.

BACKUP DRIVES

Your KIC system is a data acquisition system. It collects data, lot’s of it. We highly recommend that you devise a hard drive backup strategy at your earliest possible convenience.

The majority of KIC’s customers backup their data using the following methods:

- Zip Drives – Fast and easy.
- Tape Drives – Slower, but backs up greater amounts of data.
- Network Backups – Fast, easy and usually lot’s of hard drive space. This method will almost always entail that you coordinate the backup routine with your Information Systems Manager. Their assistance may help to provide you with a fully automated backup.

Firmware Compatibility's

There are two pieces of "firmware" that routinely upgraded to facilitate major changes in both the hardware and software:

- **Thermocouple Processing Unit (TPU) EPROM** – The EPROM (Erasable/Programmable Read Only Memory) device contains the instruction set that allows the TPU to perform the work of assimilating and processing temperature data from several input sources and sending the information to the computer.
- **SlimKIC and SlimKIC-II Thermal Profiler PROM** – The PROM (Programmable Read Only Memory) device onboard the SlimKIC contains the instruction set that provides the capabilities of communicating with the computer using RF or Direct Connect, as well as providing the versatility of selecting data sampling rates.

Because of their fixed and limited capabilities the KICboard, Quick-KIC Thermal Recorder, and SideKIC Thermal Profiler require no firmware upgrades in order to utilize any of the KIC software. Most of the upgrades to the SlimKIC and TPU firmware deal with enhance communication features as well as optimize data collection.

	DOS-KIC	Windows v2.0.1	Windows v2.2
KICboard	N/A	N/A	N/A
Quick-KIC	N/A	N/A	N/A
SideKIC	N/A	N/A	N/A
SlimKIC	1.2 ~ 3.1	2.0 ~ 3.1	2.0 ~ 3.1
TPU			
Single	4.16 only	4.23 ~ 4.35	4.23 ~ 4.47
KIC-Link (2)	4.16 only	4.23 ~ 4.35	4.47 only
KIC-Link (>2)	4.16 only	4.35 only	4.47 only

Firmware compatibility table

As of this writing, the table below outlines the firmware versions and which KIC software versions will support them. As you can quickly see, these upgrades are also dependent upon how you employ you KIC system.

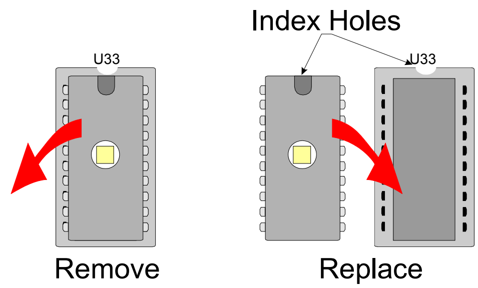
KIC offers free upgrades for firmware. If you are unsure of whether or not you should upgrade the firmware in your KIC system, please feel free to contact KIC Technical Support with your questions. To help use expedite your call, you should have the following information available:

- Which type of KIC system do you have?
- How many of them are there?
- How are they connected? (i.e., are they networked or standalone)

TPU EPROM REMOVAL & REPLACEMENT

CAUTION – these procedures should only be performed by a qualified technician.

To remove the TPU EPROM, remove power from the TPU and ensure that you are electrostatically ground. Remove the TPU cover and use the proper IC extractor to remove the EPROM (U33) from the motherboard socket. The below illustration shows the EPROM with the die window visible, but the old and new EPROM will have a sticker cover this window denoting the EPROM's version number.



To replace the EPROM, first ensure that the pins are coplanar and symmetrical, then observe that the EPROM index is facing toward pin 1 on the board socket. Carefully align the EPROM pins to the socket holes, then apply light but firm pressure on the top of the EPROM, taking care not to bend the pins.

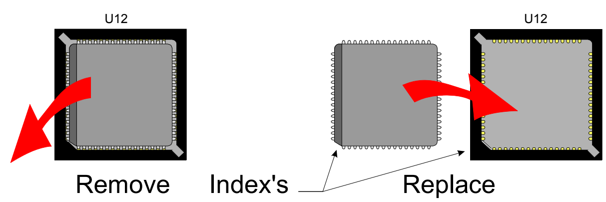
Note: DO NOT FORCE THE EPROM INTO THE SOCKET. This will damage the EPROM pins.

Although the EPROM can be erased and reprogrammed with the newest instruction set, KIC Technical Support has limited resources to support this because of the wide and varied equipment used in the field. However, if you still prefer to burn-in the EPROM yourself, KIC can provide you with the hex-file by e-mail.

SLIMKIC PROM REMOVAL & REPLACEMENT

CAUTION – these procedures should only be performed by a qualified technician.

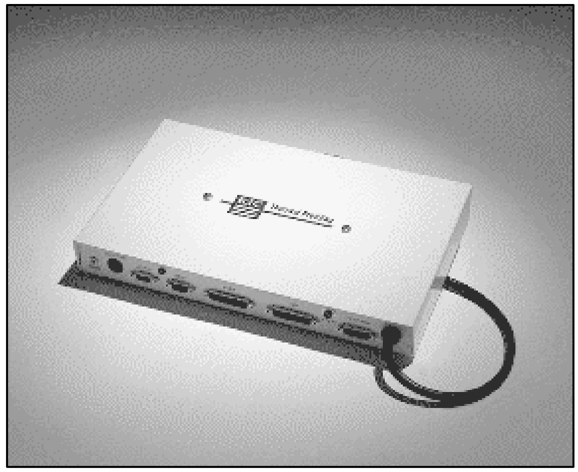
To remove the SlimKIC PROM, remove power from the SlimKIC and ensure that you are electrostatically ground. Remove the SlimKIC cover and use the proper IC extractor to remove the PROM (U12) from the motherboard socket.



To replace the PROM, first ensure that the pins are coplanar and symmetrical, then observe that the PROM index is facing toward pin 1 on the board socket. Carefully align the PROM pins to the socket holes, then apply light but firm pressure on the top of the PROM, taking care not to bend the pins.

Note: DO NOT FORCE THE PROM INTO THE SOCKET. This will damage the pins on the socket.

Thermocouple Processing Unit (TPU)



Thermocouple Processing Unit (TPU) - This is the primary device through which all other subsystems are routed and temperature data collected. It's configuration is very versatile in that it can be modified or expanded to meet the changing needs of the customer.

"Thermocouple Processing Unit" and "TPU", are synonymous with the term "Satellite", and are used throughout this document.

Primarily designed to facilitate incoming temperature data measured at 30 stationary points inside a conveyorized oven, it can also be used to independently collect live data from 6 thermocouples attached to a product via it's Traveler port, or up to 12 thermocouples attached to a product via it's Receiver port.

Input and Output ports allow a series of up to nine TPU's to be networked in daisy-chained fashion.

Temperature Profiles can be started directly from the TPU via the Start button, and a jack is provided to allow a manually operated Belt Speed check button to be attached.

TPU SPECIFICATIONS

Accuracy – ±2ºF (±1.2ºC)

Thermocouple Compatibility – K Type only

Temperature Range – -150ºC ~ 1050ºC

Maximum Readings per Second from Product Thermocouples – 2.5

Maximum Readings per Second from KICprobes – 0.2

Computer Compatibility – AT or MicroChannel

Dimensions – 13.5"L x 8.5"W x 2"H

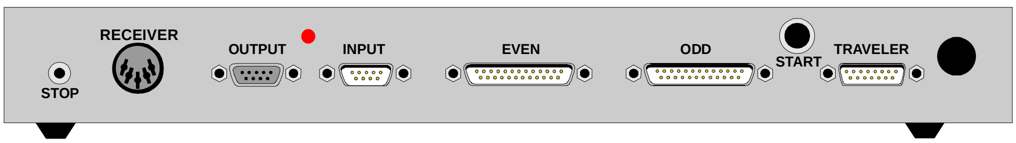
Power Requirements – 85 ~ 246VAC, 47 ~ 440Hz, meets VDE safety

Front Panel

The front panel of the TPU is where all the data acquisition and communication peripherals are connected. There are 7 ports that facilitate throughput of various information:

- 1 Traveler port - 15 pin male
- 2 KICprobe ports - 25 pin male
- 1 Input port - 9 pin male
- 1 Output port - 9 pin female
- 1 Receiver port - 6 pin female
- 1 Stop port - jack

Additionally, the front panel contains a Start button, LED light and an AC power input cable.



TRAVELER PORT FUNCTION

The Traveler port serves two purposes:

- **Primary** - A Thermocouple Extension is attached to the TPU when “trailing wire” profiling is performed.
- **Secondary** – A thermocouple simulator is attached to the TPU for calibration.

ODD/EVEN PORTS FUNCTION

The ODD and EVEN ports on the TPU serve the sole purpose of providing input to the TPU from the KICprobe(s). These are 25 pin male (RS-232 type) connectors that are specially designed to maintain the integrity of thermocouple signals traveling from the KICprobe to the TPU.

The TPU is normally shipped with two KICprobes. The KICprobe labeled ODD is always connected to the ODD TPU connector and the EVEN KICprobe to the EVEN TPU connector.

Single KICprobe installations are typically facilitated through the use of a single KICboard, unless the customer specifically requests the purchase of a TPU. On the rare occasion that a single KICprobe is used in conjunction with a TPU, the KIC software is used to designate which connection (i.e., ODD or EVEN) is being used. In this case the software setup is adjusted to accommodate the hardware setup.

As with all devices connected to the TPU, it’s important to be careful when attaching or removing the KICprobe connectors. Each KICprobe connector includes two small screws used to ensure a positive connection to their respective ports. They must be backed out prior to removing the connector. Ensure that the cables are only removed by firmly grasping the connectors and pulling straight out.

TPU INPUT/OUTPUT PORTS FUNCTION

- **Output Port**- This port is a female DB-9 connector and is used to connect the TPU to the computer via an RS-232 or KIClink interface.

  When a standalone TPU is installed it will utilize an RS-232 interface that comes with a specially wired serial cable (shipped with the unit) that is limited to maximum length of 50' (15.3 meters) in length for reliable transmissions. Under special circumstances a KIClink Adapter can be used to boost the transmission signal of a single TPU if the distance to the computer exceeds this distance.

  When multiple TPUs need to routed into the same computer COM port a KIClink network is installed. A KIClink will allow up to 9 TPUs to be daisy-chained in a serial fashion to one computer COM port and can facilitate the use of other devices such as Thermal Receivers and KIC Alarm Relays on each TPU as well. In this case, a KIClink Adapter must be used, regardless of distance.

  The KIClink Adapter is used to allow multiple devices to share a single transmission line, as well as "boost" the line signal enough to allow reliable transmissions of up to 3,600' (1,097meters). The combined distances between all the TPUs and the computer should not exceed this distance.

- **Input Port** - This port is a male DB-9 connector. It's primary purpose is to allow other devices to be connected in serial fashion through the TPU using a KIClink protocol. This is where the output of another TPU, located further up the network, would be attached. Using both the Input and Output ports, it's possible to daisy-chain a string of TPUs together to form a network.

  Secondly, the KIC Alarm Relay uses this port to receive alarm signals from the TPU. When used in conjunction with a KIClink network, the KIC Alarm relay possesses a "pigtail" cable to allow the throughput of other TPUs on the network since the input port is already in use.

  WARNING: The AC adapter cabling for the SideKIC or SlimKIC Thermal Receiver has a female DB-9 connection that can mistakenly be attached to the TPU Input port. <u>Never</u> attach this cable to the TPU port.

  Cables typically connected to these ports have 2 thumb screws each. Ensure that the screws are tightened when attaching a cable to these ports, and are backed out prior to removing the connector. Ensure that the cables are only removed by firmly grasping the connectors and pulling straight out.

RECEIVER PORT FUNCTION

The Receiver port is a female DIN-6 connector and is used for the sole purpose of allowing a Thermal Receiver to be directly attached to the TPU. The advantage of this is that the temperature data transmitted (RF) from a SideKIC or SlimKIC is received by the computer via the TPU cable connection and allows the Thermal Receiver to remain in close proximity to the RF device. This close proximity permits a more optimum and reliable reception of the radio signal.

To attach the Thermal Receiver to this port, firmly grasp the Thermal Receiver's male DIN-6 connector, ensuring that the index is on the top, then press it straight into the TPU Receiver port. Ensure that the Thermal Receiver cable is only removed by firmly grasping the connector and pulling straight out.

STOP PORT FUNCTION

The Stop port is a female jack connection that allows the Belt Speed Check Button to interface with the TPU. Generally, this port is utilized when the customer doesn't have a Thermal Receiver connected to the TPU, but still needs to check the accuracy of the oven's conveyor speed. A typical TPU setup without a Thermal

Receiver may include this connection as well as the use of a Thermocouple Extension cable plugged into the Traveler connection for running temperature profiles.

START BUTTON FUNCTION

The Start button is a momentary press switch used to start a profile directly from the TPU. There are many optional ways of starting a profile using the KIC hardware and software:

- TPU Start Button (normal)
- Belt Speed Check Button on the TPU(with start/stop functions reversed).
- Thermal Receiver Start Button (normal)
- Thermal Receiver Belt Speed Check Button (with start/stop functions reversed).
- Pressing the F2 key on the computer keyboard (most popular).
- Clicking on the GO button on the KIC software toolbar.
- Lifting the Start switch on the SlimKIC Thermal Profiler.
- Downloading a data logged profile from the SlimKIC Thermal Transmitter/Data Logger.

  NOTE: Though not strictly "starting" a profile, downloading a data logged profile will initiate the appropriate dialog boxes on the KIC software that reflect a profile has started and ended.

The Start button on the TPU is generally only used when a Thermocouple Extension Cable is employed and the computer keyboard is out of reach of the technician.

LED FUNCTION

The function of the red LED on the face of the TPU is just an indication that the TPU is either on or off and that it is performing it's job, as indicated by a persistent blinking.

Failure of the LED to blink indicates a "hung" TPU and merits investigation into the cause.

If you find that the TPU is powered, but the LED is not responding, pressing the Start button on the front panel will reset the TPU.

AC POWER INPUT CABLE

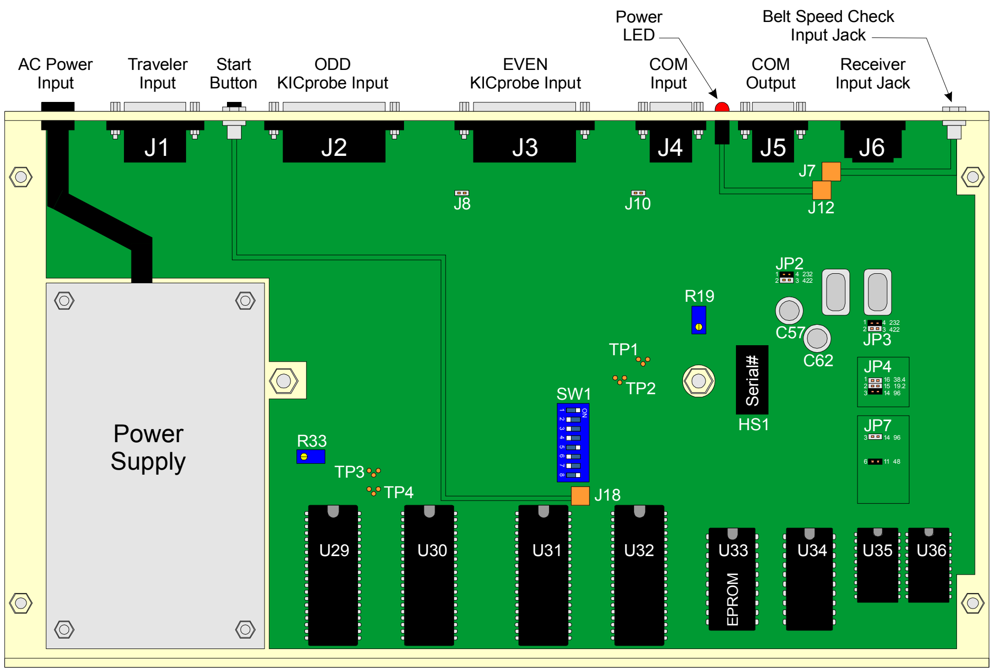
The AC power cable is the only source for applying or removing electrical power to the TPU. The TPU is shipped with a standard 110VAC, 3 wire cable. Since the TPU power supply can accommodate any standard AC input between 85~246VAC and 47~440Hz, the only modification required when reconfiguring the TPU for a different AC source is the plug.

The TPU power supply is protected by a 250VAC/2A fuse mounted directly on the power supply.

Internal Components

TPU SERIAL NUMBER LOCATION

The serial number of the TPU can be found inside. Remove the TPU cover and locate the small black, rectangular shaped block (HS1) where the thermocouple cold junctions meet. The TPU serial number is etched on the top of this block.



TPU DIP SWITCH (SW1)

SW1 is a bank of DIP switches used to set the address of the TPU and select which protocol will be used to communicate with the KIC software.

To change the setting of a DIP switch, first ensure that the TPU is powered OFF by unplugging it's power connector from the AC source. Ensuring that you are properly grounded to prevent any accidental electrostatic discharge from damaging the TPU, carefully remove the cover from the TPU and locate the DIP switch that will be changed.

Using a small tool, gently move the two position switch from one setting to the other, being careful not to let the tool slip.

- **SW1-1 through SW1-4**- These switches are used to set the TPU address. The combined states of these switches will assign a TPU 1 of 15 possible addresses, however the KIC software will normally only allow the use of the first 9.

ADR	SW1-1	SW1-2	SW1-3	SW1-4
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF
7	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON
9	ON	OFF	OFF	ON

TPU Address Table

- **SW1-5** - This switch is reserved for special use and should always be placed in the ON position.

  For older hardware setups using the DOS version of the KIC software, placing this switch in the off position will reassign the numbering scheme inside the KICprobe. The thermocouples inside the ODD KICprobe will be assigned 1~15 instead of 1~29, and the thermocouples inside the EVEN KICprobe will be assigned 16~30 instead of 2~30.

  SW1-5 should never be in the off position without first consulting KIC Thermal Profiling directly.
- **SW1-6 and SW1-7** - These two switches do not currently support any feature on the TPU, and must always be placed in the OFF position.
- **SW1-8**- This switch is used to inform the KIC software which communication protocol is being used by the TPU. In the ON position, the TPU will use a standard RS-232 protocol. In the OFF position, the TPU will use a KIClink protocol.

  It should be stated that a network setup must always use a KIClink protocol. Mixing of the two protocols will render the entire network inoperative. However, you can assign up to 9 TPUs using a KIClink protocol to one COM port, and a single TPU using a standard RS-232 protocol on different COM port on the same computer.

  The SW1-8 setting must be matched to the settings of jumpers 2 and 3, which are the TPU's hardware communication speed settings.

TPU JUMPERS

Hardware jumpers are used inside the TPU to establish and maintain certain communications features that should not be changed from the software.

To change the setting of a jumper, first ensure that the TPU is powered OFF by unplugging it's power connector from the AC source. Ensuring that you are properly grounded to prevent any accidental electrostatic discharge from damaging the TPU, carefully remove the cover from the TPU and locate the jumper that will be changed.

Using a small set of tweezers or needle-nosed pliers, gently remove the jumper from the pin posts then carefully place the jumper over the pin posts for the new setting and apply light pressure to the back of the jumper. The jumper should slide onto the pin posts without resistance.

- **JP1** - *not used*
- **JP2 and JP3**- These jumpers are used to assign a communications protocol on the TPU, and are used in conjunction with SW1-8.

With pins 1 and 4 jumped (closed) the TPU will be set for a standard RS-232 communications protocol. (SW1-8 must be ON)

With pins 2 and 3 jumped (closed) the TPU will be set for a KIC-Link (422) protocol. (SW1-8 must be OFF)

- **JP4**- This jumper is used to determine the communication speed, or baud rate, that the TPU will communicate with the computer's COM port. These baud rates are 9600 and 19200. All TPUs on the same network must use the same baud rate.

  With pins 3 and 14 jumped (closed) the TPU will be set for 9600 baud. If the installation involves an older computer setup, it's important to know which type of UART is being employed on the COM port of the computer. If the COM port is utilizing an 8450 or 8550 UART, you must ensure that only a 9600 baud rate is configured.

  Note: Earlier versions of the TPU are only able to communicate at 9600 baud. For this reason, all TPUs are shipped from KIC with a default setting of 9600 baud to ensure compatibility with these earlier TPU versions should they all be employed on the same network.

- **JP5** - *not used*
- **JP6** - *not used*
- **JP7** - This jumper regulates the baud rate for the SideKIC or SlimKIC when their data is being routed through the TPU to the computer via the Thermal Receiver connected to the Receiver port.

  With pins 6 and 11 jumped (closed) the throughput will be set for 4800 baud. The TPU also employs a divide-by-four counter that allows a setting of 4800 baud to operate at 1200 baud. The current revision of the TPU will only support a reliable throughput of 1200 baud, so this configuration is the default and should not be changed at this time.

- **JP8**- *not used*
- **JP9** - *not used*
- **JP10**- *not used*
- **JP11**- *not used*
- **JP12** - *not used*

TPU POTENTIOMETERS

There are two potentiometers inside the TPU used to calibrate the unit, R19 and R33. To access these potentiometers, carefully remove the cover of the TPU.

It is important to note that adjustment of these potentiometers necessitates the need for live electrical power on the TPU. *Use extreme caution when working inside the TPU with the power on.*

- **R19** - is used to adjust the linearity of the of the calibration slope.
- **R33** - is used to adjust the span of the calibration slope.

These potentiometers are extremely sensitive and should be adjusted very slowly. Additionally, the TPU reaction to any adjustments on these two potentiometers will lag a few seconds.

The best method to use when adjusting these potentiometers is to make a very small adjustment, observe the corresponding reaction on the measurement instrument, then waiting for the measurement to settle down before making another adjustment.

TPU TEST POINTS

The four test points inside the TPU (TP1, TP2, TP3 &TP4) are used in conjunction with the calibration of the unit. These test points are only employed in the event that a normal calibration using a thermocouple simulator cannot be performed because the calibration is too far out of range.

It is important to note that measurement of the voltage across these test points necessitates the need for live electrical power on the TPU. *Use extreme caution when working inside the TPU with the power on.*

- TP1 & TP2 - These two test points are used to measure voltage when the linearity is out of range. Adjustments to the linearity potentiometer (R19) are made until the voltage across these two test points achieves 12 millivolts.
- TP3 & TP4 - These two test points are used to measure voltage when the span is out of range. Adjustments to the span potentiometer (R33) are made until the voltage across these two test points achieves 2.5 volts.

TPU EPROM FUNCTION

The PROM (Erasable/Programmable Read Only Memory) device contains the instruction set that allows the TPU to perform the work of assimilating and processing temperature data from several input sources and sending the information to the computer.

TPU POWER SUPPLY

The TPU power supply can accommodate 85 ~ 246VAC, 47 ~ 440HZ inputs, which lends itself well to supporting the myriad of AC source voltages worldwide. The output side of the power supply is connected to J17 on the TPU motherboard.

The power supply is self switching and regulating which foregoes the need to rewire the unit depending on it's destination. A 250v, 2A fuse is located underneath the power supply cover.

Calibration

The suggested calibration frequency cycle for the TPU is 6 months. We recommend that it be performed at least annually.

To properly calibrate the TPU you will need a type-K thermocouple simulator and possibly a digital voltmeter. Throughout this calibration procedure, the Fahrenheit scale will be used.

TPU PRIMARY METHOD OF CALIBRATION

Perform the following procedure to calibrate the TPU within $\pm$2.0°F ($\pm$1.2°C):

- Turn on the computer and the TPU and start the KIC software.
- With the cover on, allow the TPU to run for at least 30 minutes.
- Remove the TPU cover.
- On the KIC software screen, turn off all display product thermocouples except number one.
- Connect the TPU calibration adapter to the Traveler port.
- Connect the thermocouple simulator to the other end of the TPU calibration adapter.

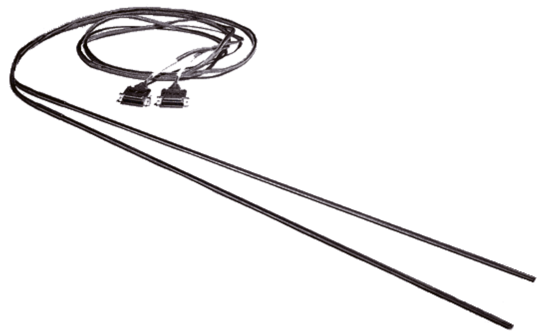
- Set the thermocouple simulator to the maximum temperature you expect to measure in your oven. Observe the temperature displayed for product thermocouple #1 on the screen. This display should update rapidly.
- Adjust the span potentiometer (R33) very slowly until this maximum temperature is reading correctly on the screen.
- Set the thermocouple simulator to below room temperature (around 40°F ~ 65°F). Again, observe the temperature displayed for product thermocouple #1 on the screen. This display should update rapidly.
- Adjust the linearity potentiometer (R19) very slowly until this temperature is correct.
- Repeat these steps until both temperatures are within the calibration specifications.
- When both temperatures are within specifications, the TPU is calibrated.

TPU ALTERNATIVE METHOD OF CALIBRATION

If the calibration slope is so far out-of-range that the primary procedure cannot be used to bring the TPU within the calibration specifications, perform the following procedure, then return to the initial procedure and attempt another calibration:

- Select volts x 10 on a voltmeter.
- Place one probe tip on TP3 and the other on TP4.
- Adjust the span potentiometer (R33) until the voltage between test points TP3 and TP4 is 2.5 volts.
- Select volts x 1 on the voltmeter.
- Place one probe tip on TP1 and the other on TP2.
- Adjust the linearity potentiometer (R19) until the voltage between test point TP1 and TP2 is 12 millivolts.
- Repeat these steps until the correct values are balanced.
- Once these voltages are within specification the calibration slope is now within the range necessary to perform the initial calibration procedure above.

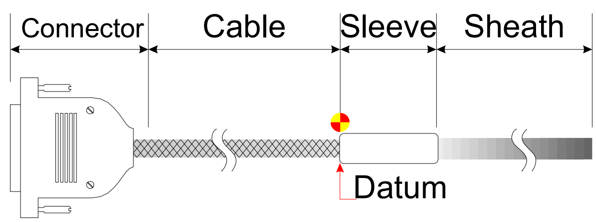
KICprobes



Commonly installed as a set of two, each KICprobe contains a compliment of 15 thermocouples typically spaced at intervals determined by the length of the process oven.

Probes designed for installation inside wave soldering ovens will have 14 thermocouples within the KICprobe sheath and the last thermocouple terminating at the end of the KICprobe in the form a female SMP connector.

The KICprobe is an elongated rigid sensor that typically contains 15 thermocouples. The thermocouple connection design is proprietary and facilitates a maximum number of thermocouple devices within the minimal area of the KICprobe's inside diameter.



The design includes protection of the thermocouple devices within the KICprobe from inadvertently grounding when used within the designed temperature tolerances.

The KICprobe has four distinct sections – the connector, cable, sleeve and sheath. The internal wiring runs from the connector to the end of the KICprobe. The sleeve is used to provide a positive connection point between the braided steel cable and the sheath.

The KICprobe materials are designed to withstand temperatures normally associated with the manufacturing of electronics products. For applications that exceed these values, contact KIC Technical Support for more information.

THERMOCOUPLE WIRE HARNESS CONSTRUCTION

Typically the thermocouple wire used within the KICprobe is the K-type specification. Different gages of Alumel and Chromel are used.

Probe Diameter	Wire Size
0.25" (6.35 mm)	28 AWG
0.375" (9.525 mm)	24 AWG
0.625" (15.875 mm)	20 AWG

PROBE SHEATH

The sheath of the KICprobe is the tube itself, and is the housing for the thermocouple wiring harness. Different sized tubing is utilized dependent upon the application's temperature extremes.

Probe Diameter	Material	Max Sustainable Temp
0.25" (6.35 mm)	Stainless Steel	842ºF (450ºC)
0.375" (9.525 mm)	Stainless Steel	1202ºF (650ºC)
0.625" (15.875 mm)	Iconel	1742ºF (950ºC)

Although the tube can be bent to more easily conform to unusual oven designs, it should not be attempted without the aid of a proper sized tube-bending tool. Kinks or abrupt bends in the KICprobe can render it inoperative. If you see a need to reshape the KICprobe, please contact KIC Technical Support for guidance.

PROBE CONNECTOR AND CABLE

The connector of the KICprobe is a typical 25-pin, female RS232 type, stainless steel AMP connector. An "E" or "O" is metal stamped into one side of the connector to help distinguish it as belonging to the "ODD" or "EVEN" KICprobe.

The connector is designed to withstand some minor abuse however, when not connected to their receptacles the pins of the connector are vulnerable to damage and should be protected. Although the cable entering the connector will withstand some minor tugging, it should be avoided whenever possible.

Additionally, it must be stated that neither the connector nor cabling can withstand prolonged exposure to acidic or base environments, such as the fluxes used on wave soldering processes. Any contact with these fluids should be promptly removed with a dry wipe dabbed in a neutralizing solution.

EXPLANATION OF THE KICPROBE PART NUMBER

The KICprobes are clearly labeled with both the part number as well as their relationship to each other. To gain a full understanding of the part number used to identify the metrics of a KICprobe, it's important to understand the method in which a set of KICprobes are designed.

Each KICprobe typically contains a maximum of 15 thermocouples and are usually installed as a pair. Therefore, a pair of KICprobes will have a complement of 30 thermocouples between them.

Additionally, the KICprobes are designated as either "ODD" or "EVEN". These terms are used to distinguish the relationship between each KICprobe. The term "ODD" denotes the KICprobe that contains all Thermocouples with odd numbered values assigned (i.e., 1,3,5,7,….29). The term "EVEN" denotes the KICprobe that contains all thermocouples with even numbered values assigned (i.e., 2,4,6,8,….30).

Sometimes there will only be the need for a single KICprobe. This type of configuration is either application or oven design dependent and is somewhat rare. The numbering scheme of the thermocouples in a single KICprobe is straightforward. They're labeled 1 through 15 sequentially.

NOTE: KIC Thermal Profiling has, at times, designed specialized single KICprobe systems as well as systems that use up to 8 KICprobes in one process. Although customized, it is important to note that in such cases where hardware or software

has been modified from stock designs, KIC will provide all the technical support necessary to complete the installation and get the system up and running.

Toward the connector end of the cable you'll find a piece of heat shrink tubing around the cable. On this you'll find the part number of the KICprobe.

The KICprobe part number contains the following information:

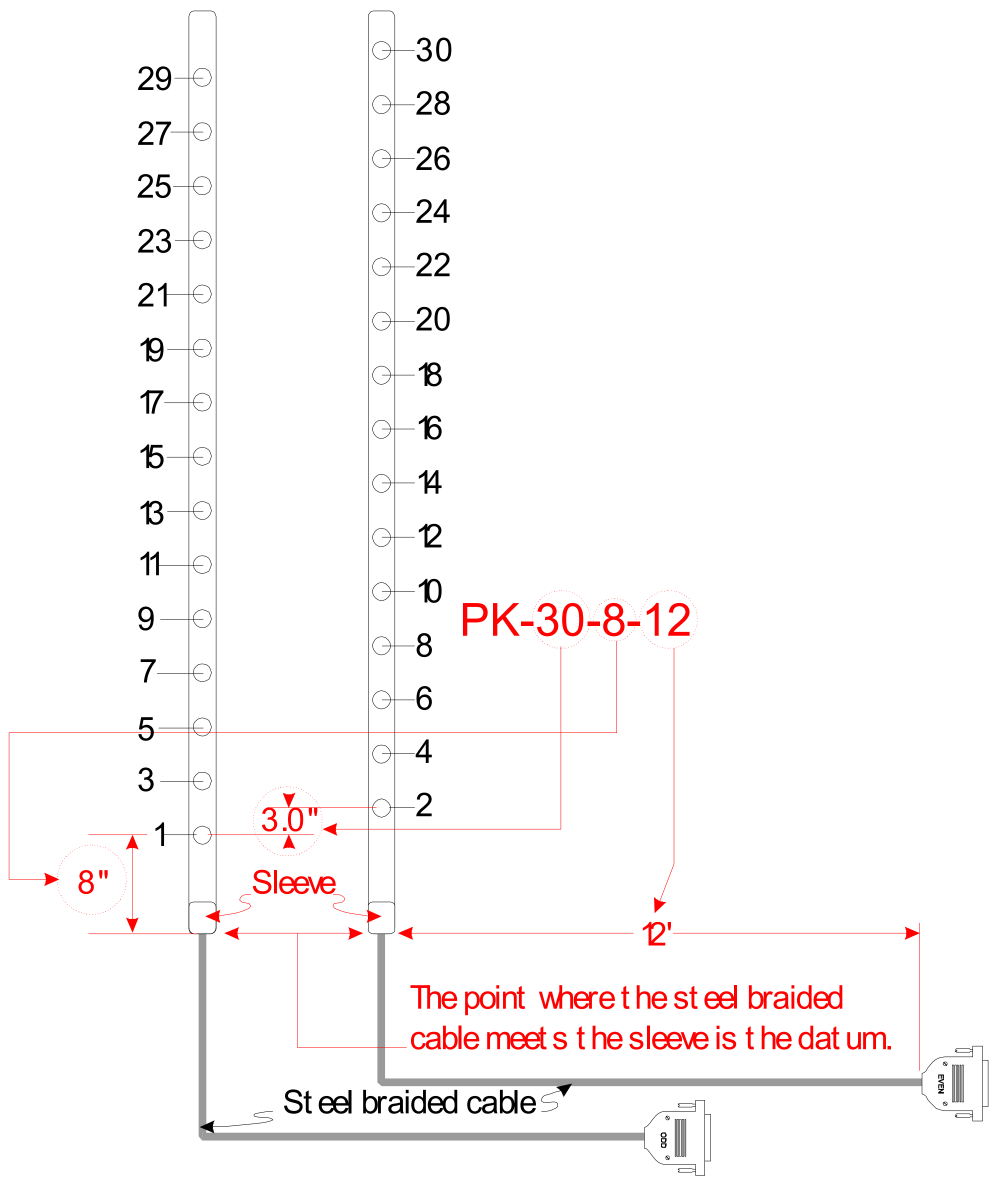
- **Process Identification** – The following table contains designators for processes that currently utilize KICprobes manufactured by KIC Thermal Profiling:

Identifier	Explanation
P	Denotes the part as a KICprobe built by KIC
K	Thermocouple Type
M	Denotes medium temperature range, up to 650ºC
H	Denotes high temperature range, up to 950ºC
NU	Denotes non-uniformed, or variably spaced thermocouples
S	Single KICprobe system

- **Thermocouple Spacing (inches)** – Typically, the thermocouples inside the KICprobe will be uniformly spaced. This value will contain 2 or 3 digits. If the value contains 2 digits, such as "30", the spacing is said to be 3.0 inches between any odd number thermocouple and an even number thermocouple.
- **Offset Value of the First Thermocouple** – Many times, the first thermocouple will be installed past the KICprobe datum. When this happens, a measure (in inches) is provided on the part number to designate it's location in the KICprobe. This value will contain 1, or 2 digits.
- **Length of Cable** – This value is in feet, and simply designates the length of the cable connecting the KICprobe to the TPU.

This drawing depicts a set of KICprobes and how to interpret the part number.

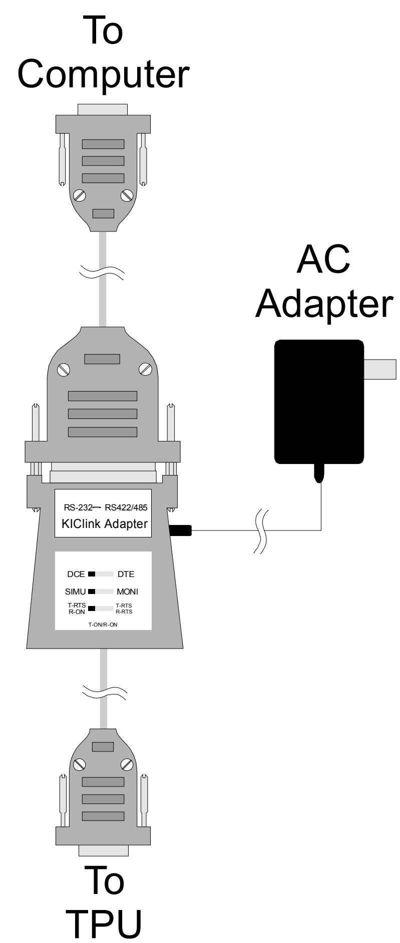
- **P** – KIC Thermal Profiling Probe
- **K** – The KICprobe contains K-type thermocouples
- **30** – The thermocouple spacing is 3.0” between ODD & EVEN thermocouples.
- **8** – The first thermocouple (on the ODD KICprobe) is offset 8” forward of the datum.
- **12** – The cable length is 12’ in length.



KIC-Link Adapter

This adapter provides the capability of connecting up to 9 Thermocouple Processing Units in a network as well as the ability to move data (via cable) a distance of about 4,000 feet (1,219 meters).

This adapter can also be used with a single TPU for the sole purpose of transmitting data extended distances where needed.



KIC-LINK ADAPTER SPECIFICATIONS

Power Supply – DC9V/200mA

Function – RS-232 to RS-422/485 converter

Transmission – Asynchronous

Maximum Transmission Distance – 4,000ft (1km)

Operate Mode – Full/Half Duplex

Data Rate – 100KBPS

Dimensions – 2.8”L x 2”W x 0.8”H

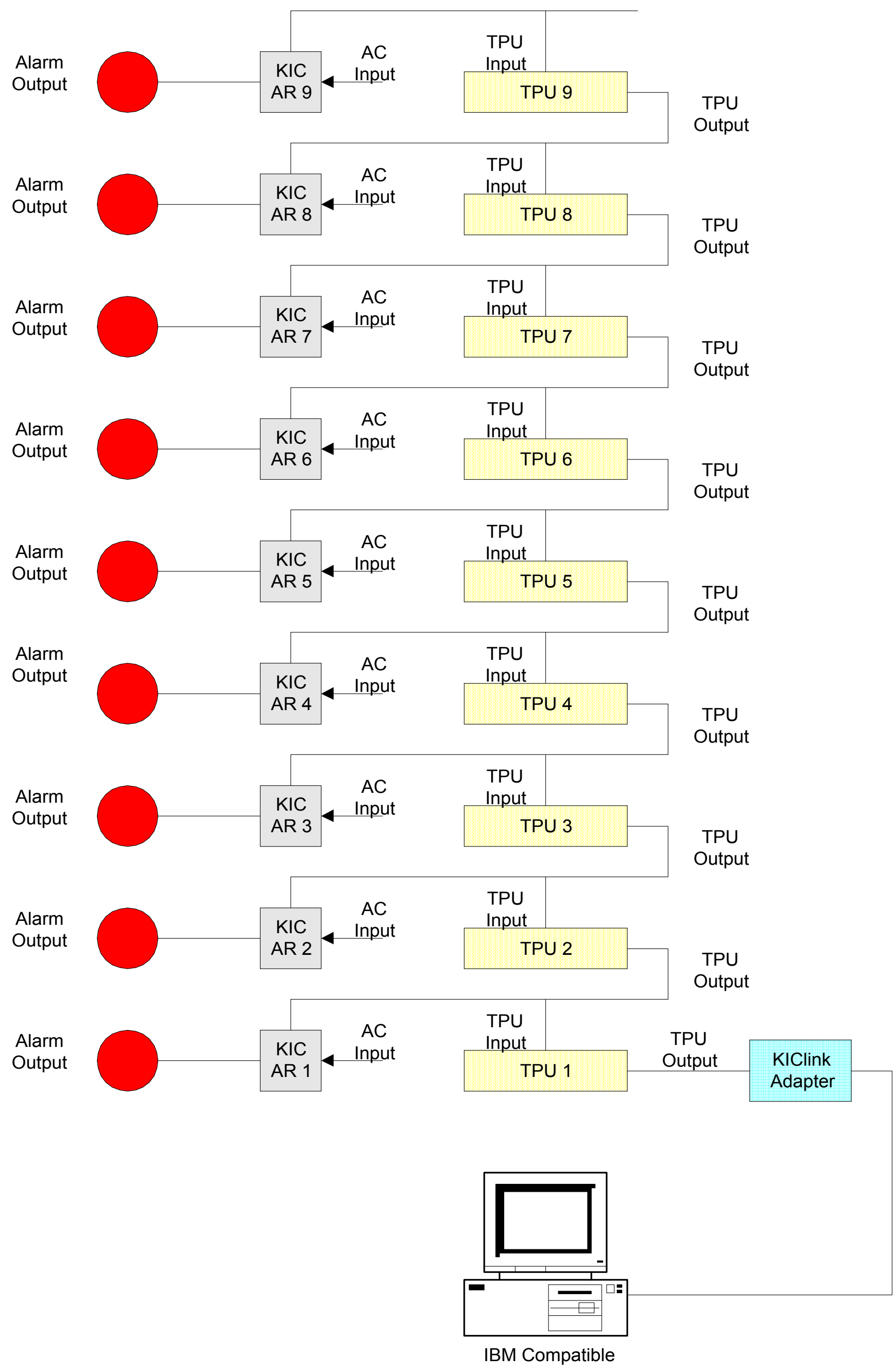


Diagram of how the TPU's are connected under a KIC-Link network setup. Each TPU has it's own individual KIC Alarm relay connected.

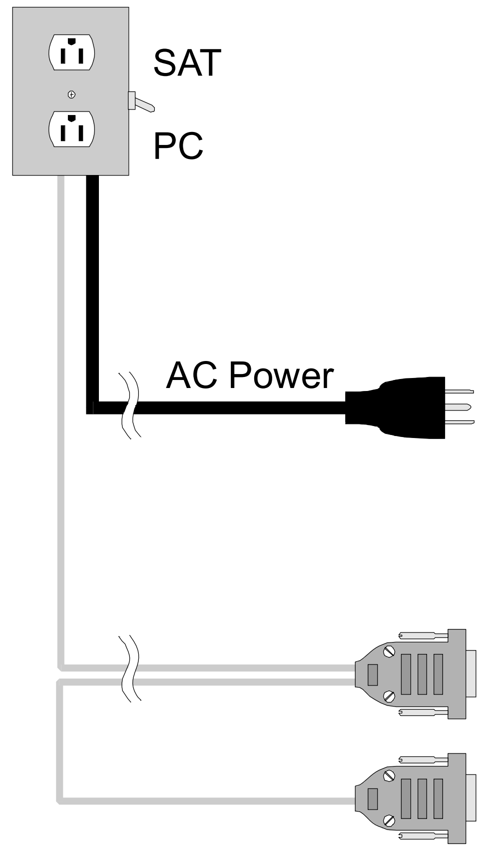
KIC Alarm Relay

The KIC Alarm relay allows the use of audible or visual queues, such as buzzers and light bars, via standard AC power.

The relay can be connected to the TPU or directly to a computer COM port. The signal cable allows throughput to and from other Thermocouple Processing Units when used in conjunction with a KIC Link network, or COM port sharing with a SlimKIC, Thermal Receiver, or TPU when connected to the computer COM port. A toggle switch is located on the relay box to select which connection mode is being used.

When used in a KIC Link network, the female connector is attached to the Input connector of the TPU and the male connector is attached to the RS-422 cable leading to the next TPU in the network.

When used directly on the computer COM port, the female connector is attached to the computer COM port and the male connector can be used to attach the Thermal Receiver, SlimKIC (via Direct Connect cable provided) or another TPU. This setup is most common for customers that are still actively using the older style KICboards.

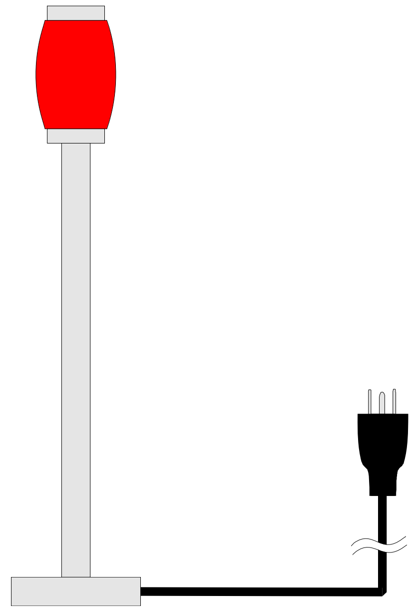


Light Tower

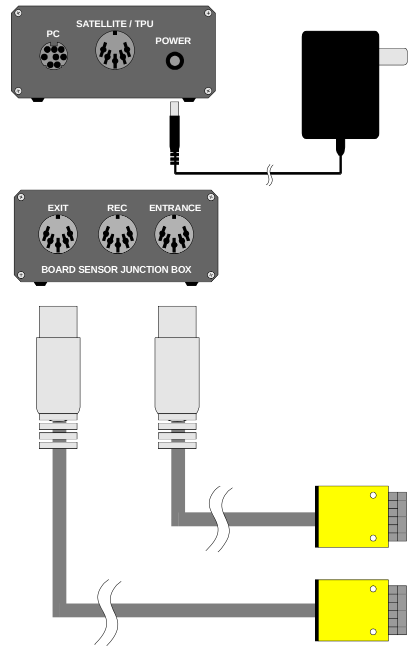
The light tower is a simple 120VAC device that contains one single light at the top, which is surrounded by a red lens.

This light tower is attached directly to the KIC Alarm relay as a means of providing a visual queue when the KIC software has determined that the oven process has achieved an out-of-control condition.

Generally, this device is attached directly to the oven equipment by means of attaching hardware to the base at the bottom of the tower.



Board Sensor System



The Board Sensor system is used to precisely measure the oven conveyor belt speed for each and every product passed through the oven and will update the belt speed used to calculate the Virtual Profile which serves to further improve it's accuracy.

This system will also maintain an accurate board count as well as continuously measure and record the product spacing and calculate the total oven loading.

Additionally, the belt speed measurement is available for output (optional) where this data can be plotted in real-time on a control chart using QC-Calc.

This is accomplished by mounting a sensor at the start and end of the oven's tunnel. This method ensures that the majority of the entire conveyor length is accounted for when measuring the belt speed.

The Board Sensor option can be utilized through the TPU or an older KICboard setup. The cable connections used to setup the Board Sensor option depends upon which type of KIC system it's being installed on.

The Board Sensor Option consists of the following components:

- **Board Sensor Junction Box** – Provides an interface between the sensors, the Thermal Receiver, and the TPU or Computer.
- **AC Adapter** – Provides DC12V/500mA to the Board Sensor Junction Box and sensor when configured for used directly from the computer COM port (i.e., as in the case of using KICboards).
- **Sensors (2)** – Detects the presence or absence of a board and sends this information to the KIC software.

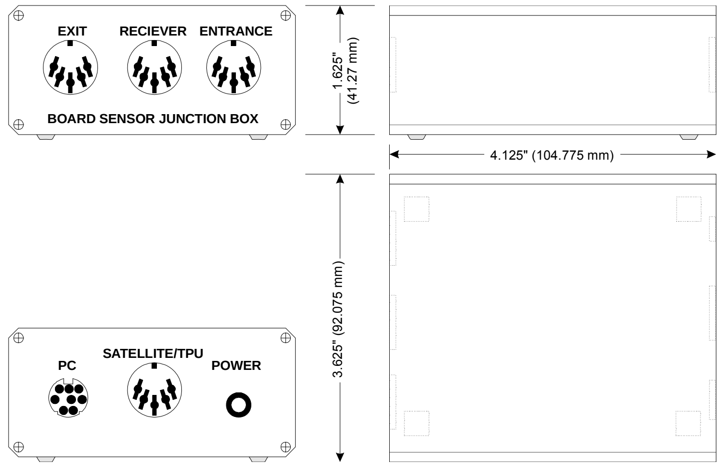
BOARD SENSOR JUNCTION BOX

The sole purpose of the Board Sensor Junction Box is to provide a single interface between all of the equipment necessary to utilize the sensors as a means of detecting the product and measuring the oven belt speed.

When attached to a TPU, the Board Sensor Junction Box receives its operating power directly from the TPU's internal power supply, which forgoes the need for the external AC Adapter.

When attached directly to the computer COM port, as in the case where old style KICboards are installed, the Board Sensor Junction Box must use the external AC Adapter in order to supply power to the sensors.

Note: The power requirements of the Board Sensor Junction Power exceed that of the main power bus of the computer. For this reason, it is not possible to utilize the computer's main bus for this device.



SPECIFICATIONS

Dimensions – 4.13"L x 3.6"W x 1.6"H

Connections – 4x 6-pin DIN; 1 x 9-pin MiniDIN; 1 power jack

Power Requirements – DC12V/500mA

BOARD SENSORS

The model SM312D is a small, rugged, self-contained, infrared diffuse proximity sensor with fast response. It can sense an object by detecting it's emitted light reflected from the object.

Diffuse mode sensors are ideal for use when the reflectivity and profile of the object to be sensed are sufficient to return a large percentage of the emitted light back to the sensor.

This sensor consist of an infrared LED light source, a sensitive phototransistor, an alignment indicator, and a custom-designed state-of-the-art CMOS integrated modulator/demodulator/amplifier circuit. Digital modulation and demodulation make these sensors highly immune to ambient light and electrical "noise".

Alignment and system performance monitoring are greatly simplified through the use of the AID™ alignment system, which lights an easily visible rear panel red LED indicator whenever the sensor sees a "light" condition, and superimpose an LED pulse rate that is proportional to the received light signal strength.

The AID™ system indicates the optimum sensor alignment and sensitivity setting, and is a valuable aid in installation and alignment.

The sensors have dual open-collector transistor outputs; a current sinking NPN output and a current sourcing PNP output, both rated at 150mA (continuous).

SPECIFICATIONS

Supply Voltage – 10 ~ 50 Vdc at less than 25mA (exclusive of load). 10% Maximum ripple.

Output Configuration – One current sourcing (PNP) and one current sinking (NPN) open collector transistor.

Output Rating – 150mA maximum each output at 25ºC derated to 100mA at 70ºC (derate=1mA per ºC).

- ✓ **Output Leakage current** – less than 1 microamp (off-state).
- ✓ **Output Saturation Voltage (PNP output)** – less than 1 volt at 10mA and less than 2 volts at 150mA.
- ✓ **Output Saturation Voltage (NPN output)** – less than 200 millivolts at 10mA and less than 1 volt at 150mA.

Protection – Protected against false pulse on power-up, inductive load transients, power supply polarity reversal. Outputs are protected against continuous overload or short-circuit of outputs.

Response Time – Sensor will respond to either a “light” or “dark” signal of 1 millisecond or longer duration, 500Hz maximum. Response time specification is independent of signal strength.

Note: 100 millisecond delay on power-up; outputs are non-conducting during this time.

Repeatability of Response – 0.3 milliseconds, independent of signal strength.

Light Beam – Visible red (650nm); for use with plastic fiber optics.

Construction – Reinforced VALOX® housing, totally encapsulated, stainless steel screws. Meets NEMA standards 1, 2, 3, 3S, 4, 4X, 12 and 13.

Cable – PVC-jacketed 4-wire cable standard.

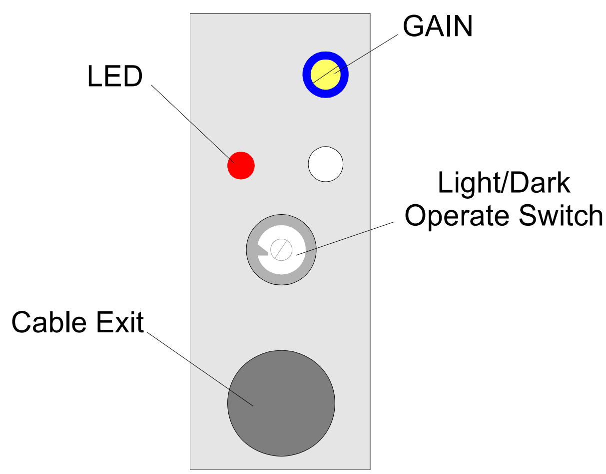
Adjustments – LIGHT/DARK OPERATE select switch and 15 turn slotted brass screw GAIN (sensitivity) adjustment potentiometer (clutched at both ends of travel). Both controls are located on the rear panel, and protected by a gasketed, clear acrylic cover.

Indicator LED – Exclusive, patented Alignment Indicating Device system (AID™) lights a rear-panel mounted red LED indicator whenever the sensor sees a “light” condition, with a superimposed pulse rate proportional to the light signal strength (i.e., the stronger the signal, the faster the pulse rate).

Operating Temperature Range – -20 ~ +70 degrees Celsius.

INSTALLATION AND ADJUSTMENT

Proper operation of the sensor requires that it be mounted securely and aligned properly. Excessive movement or vibration can result in intermittent or false operation caused by loss of alignment.



- Begin with the sensor at the desired distance from the object to be sensed and at the approximate position where it will be mounted. The background should be as far behind the object as possible (at least three times the distance of the sensor from the object) and as dark a color as possible compared to the object. Ideally, the object should present its largest reflective surface to the sensor.
- Apply power to the sensor and advance the 15-turn GAIN control to maximum (clockwise end of rotation). If the sensor is “seeing” its reflected light, the sensor alignment LED should be “on”. Move the sensor up-down-right-left (include angular rotation) to obtain the fastest alignment LED pulse rate.

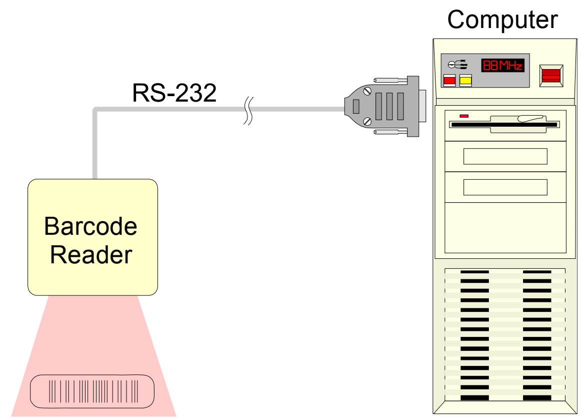
  If a pulse is not observable (too fast to count), reduce the GAIN control (counterclockwise rotation) to obtain a countable pulse rate.
- Repeat the alignment motions after each GAIN reduction. When you’ve found the sensor orientation that produces the fastest pulse rate, mount the sensor solidly in that position. Increase the receiver GAIN to maximum.

Test the system by removing the object from the sensing position. The receiver LED indicator should go “off”. If the LED indicator does not go “off”, the sensor is reacting to light reflected from a background surface. Reduce the GAIN setting until the alignment indicator goes “off”, plus two additional full turns.

Again, place the object in the sensing position. If the alignment indicator does not come “on”, the sensor is receiving as much or more light energy from the background as from the object. Consider the following alternatives:

- ✓ Move the sensor closer to the object and reduce the sensitivity (GAIN).
- ✓ Reduce background reflectivity by painting the background with flat-black paint, or by scuffling the background or cutting a hole through it.
- ✓ Tilt the sensor of the background so that the sensing beam is not perpendicular to the background.

Barcode Reader



Barcodes are a proven and effective method of tracking the product from process to process. KIC Thermal Profiling provides software support for interfacing your standard RS-232 based barcode readers with your KIC system.

When used, the KIC software can maintain an ongoing log of these barcodes in the Event Browser. Retrieving a particular barcode number from the Event Browser is as simple as a database query.

Once selected from the Event Browser, a complete history of the oven's temperatures and Virtual Profile at the time that particular product was processed will immediately appear on the X/Y-graph of the KIC software.

This simple task provides the traceability often required to account for the product quality. Furthermore, using the analysis tools provided in the KIC software, it's possible to further scrutinize this information beyond just viewing it.

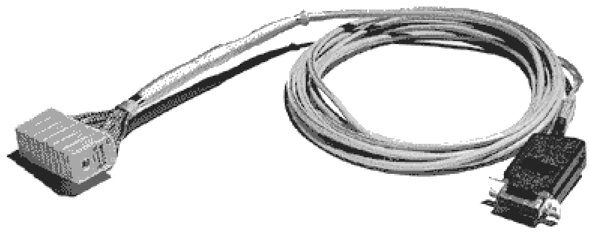
BARCODE OEM AND CUSTOMER PROVISIONS

In most cases, barcode readers are standardized throughout a manufacturing facility. The customer generally supplies these standardized barcode readers in order to prevent mixing and matching of non-standardized equipment. Barcode reader models and styles vary widely, as do their functions and capabilities.

For this reason, KIC Technical Support can only provide limited support for the barcode reader actually employed. First tier technical support for the barcode reader itself should be referred to the barcode reader manufacturer. However, KIC can provide unlimited support for the KIC software facilities that interface with the barcode readers.

Additionally, it's important to ensure that there are enough COM ports available on the computer running the KIC software to implement the use of the barcode readers. Generally, this will entail one barcode reader per COM port; however, there are some barcode readers that support the use of multiple readers on a single COM port.

Thermocouple Extension Cable



This cable is specifically designed to interface through the TPU via the port labeled "Traveler", and is used to collect live temperature data directly through the TPU.

The Thermocouple Extension Cable is used to perform what are called "trailing wire" profiles and is not unlike connecting a thermocouple wire to a chart recorder except that the data is recorded digitally.

The product thermocouples (male SMP connectors) attach directly to the Thermocouple Extension Cable (female SMP connectors).

SPECIFICATIONS

Indefinite Temperature Rating – 218ºC

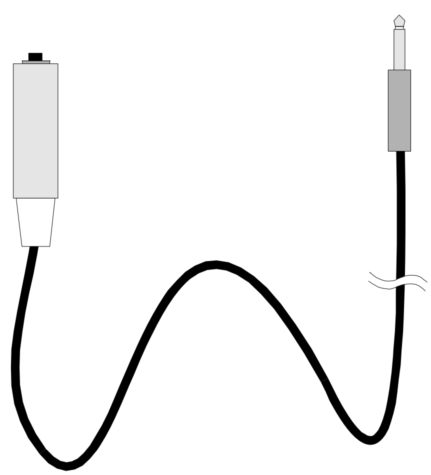
Short Term Temperature Rating – 300ºC

Dimensions – 5' ~ 50' lengths. The cable's length will typically be 5~10 feet (1.5~3 meters) longer than the process tunnel and is included with TPU's where the Thermal Receiver option is not purchased.

Maximum Number of Thermocouples – 6

Thermocouple Type – K Type only

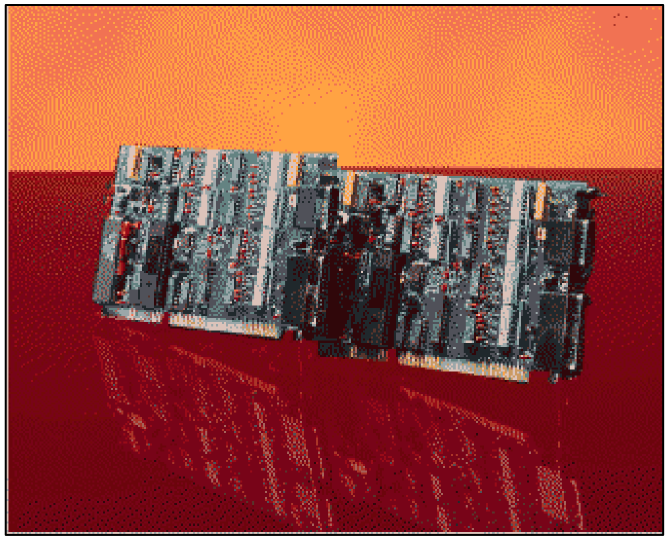
Belt Speed Check Cable



This is a long cable with a handgrip and push-button. This cable is used to perform very accurate checks of the oven belt speed. An accurate belt speed is essential when using certain functions of the KIC software.

The Belt Speed Check cable can attach to either the TPU or the Thermal Receiver. In the case where Board Sensors (optional) are included as part of the Prophet Thermal Manager, this cable is not used.

KICboard & Quick-KIC Thermal Recorder Cards



The Quick-KIC Thermal Recorder and KICboard are 16-bit AT compatible plug-in cards. Essentially, these two cards are the same part, but employed in different ways.

The Quick-KIC Thermal Recorder uses only the Traveler port. This port is used by the Thermocouple Extension cable, which is usually a custom length. The purpose of the Quick-KIC Thermal Recorder is to allow rapid temperature data acquisition from up to 6 K-type thermocouples. The card can acquire up to 3.3 samples per second on each of the 6 thermocouples.

The Quick-KIC Thermal Recorder setup on the KIC software is much the same as the KICboard, except that only one card (labeled "KICboard") is selected in the Hardware Input Monitor dialog box.

When used to monitor temperatures from a set of KICprobes (older setup), it's called a KICboard. KICboards typically came in pairs as do the KICprobes, but can also be used as a single board to accommodate a single KICprobe. In this configuration, the card can acquire 2.5 temperature samples per second, while the KICprobe connected to the card can acquire up to 0.2 temperature readings per second.

When shipped as a pair, the KICboards are labeled as ODD and EVEN. The Traveler connector on the ODD KICboard will monitor product thermocouples 1 ~ 6, while the EVEN KICboard Traveler connector will monitor product thermocouples 7 ~ 12.

SPECIFICATIONS

Accuracy – $\pm$3.6ºF ($\pm$2.0ºC)

Thermocouple Compatibility – J, K, N, S, T

Temperature Range – -150ºC ~ 1200ºC

Maximum Readings per Second from Product Thermocouples – 6.0

Maximum Readings per Second from KICprobe Thermocouples – 0.2

Computer Compatibility – AT

Dimensions – 6.5"L x 4.5"W

Power Requirements – N/A

CONNECTOR PANEL

The panel of the KICboard or Quick-KIC Thermal Recorder has only 2 connectors:

- Traveler Port (J2) - The Traveler port is where you connect the Thermocouple Extension cable on the ODD KICboard and Quick-KIC Thermal Recorder. This port is also used to calibrate the card.
- KICprobe Port (J1) - The KICprobe port is only used on the KICboard and will be labeled as either ODD or EVEN. In the event that a KICboard is used in unison with a single KICprobe setup, this port will not be labeled.

SERIAL NUMBER LOCATION

The serial number on the boards is etched on the non-component side, in the upper left corner.

JUMPERS

- **ADR** - There are two jumpers for the ADR: A3 and A2. The combination of these two jumpers distinguishes the card as either an ODD KICboard (or Quick-KIC card) or an EVEN KICboard.

  The setup for an ODD KICboard <u>or</u> a Quick-KIC card is:
  - ✓ A3 set for 0 (left and center pins jumped)
  - ✓ A2 set for 0 (left and center pins jumped)

  The setup for an EVEN KICboard is:
  - ✓ A3 set for 0 (left and center pins jumped)
  - ✓ A2 set for 1 (right and center pins jumped)
- **JP4**- This jumper is for providing an auxiliary ground point and is only used when a KICprobe monitoring a high temperature process is connected. This will eliminate "spikes" in the data that cannot be cleared by the KIC software filter algorithms normally used.
- **JP5**- This jumper sets how many interrupts (see JP6) the board generates per second. It has three positions: 480, 240 and 120. The default position is 240 and should normally never be changed.

  These settings are matched to settings on JP7. HI and 480, M and 240 (default), LO and 120.
- **JP7** - This jumper sets the sampling rate for the board. It has three positions: HI, M, and LO which correspond to High, Medium and Low. The default position is M, and should usually not be changed.

  HI sets the sampling rate to 60 readings per second, M sets the sample rate to 30 readings per second, and LO sets the sampling rate to 15 readings per second. HI can be "noisy", but M and LO are about equally "quiet", thus M is used because it is faster.

  This jumper is used in conjunction with the ADR jumper.
- **JP6** - This jumper is used to set the interrupt (IRQ) for the card. When used with the Windows version of the KIC software an interrupt must be selected, however, when used as a pair of KICboards, only one of the two cards should have an interrupt set. The interrupts available are 3, 4, 5, 10, 11, 12, and 15.

  Note: The best interrupt to use is one is usually not assigned to common devices. As a general rule, interrupts 3 and 4 should normally not be used because they're usually assigned to the COM ports. Interrupt 10 is usually the default for a network card if it's installed in the computer. Interrupt 12 is often used by a bus type mouse if used.

  The best interrupt to use is 15 and this is the default setting for the board when shipped.

When used with the DOS version of the KIC software, no interrupts are used and the normal position for the jumper is OFF.

POTENTIOMETERS

The KICboard or Quick-KIC cards have 2 potentiometers used for calibration:

- R5 - This potentiometer is used to adjust the linearity of the board's calibration slope.
- R4 - This potentiometer is used to adjust the span of the board's calibration slope.

TEST POINTS

The KICboard or Quick-KIC cards have 4 test points used for calibration:

- TP1 & TP2 - Used together to provide the technician with reference voltages when adjusting the span potentiometer (R4) to the point where a normal calibration can be performed.
- TP3 & TP4 - Used together to provide the technician with reference voltages when adjusting the linearity potentiometer (R5) to the point where a normal calibration can be performed.

TRAVELER PORT CONNECTION

The Traveler port serves two purposes:

- **Primary** - This is where the Thermocouple Extension is attached to the card when "trailing wire" profiling is performed. Trailing wire profile involves feeding the cable through the oven as the profile is being run. This type of profiling is "live", or real-time, in the sense that the temperature information being measured at the product is feed live through the cable and into the card.
- **Secondary** - This is the point through which the card is calibrated. A special attachment is shipped with the card that allows you to perform calibrations on the card in-house. This attachment is a single K-type thermocouple with a 15 pin female connection at one end which is attached to the card, and a male SMP connector at the other which is connected to a thermocouple simulator.

KICPROBE CONNECTION (KICboard ONLY)

The ODD and EVEN ports on the TPU serve the sole purpose of providing input to the TPU from the KICprobe(s). These are 25 pin male (RS-232 type) connectors that are specially designed to maintain the integrity of thermocouple signals traveling from the KICprobe to the TPU.

The TPU is normally shipped with two KICprobes. The KICprobe labeled ODD is always connected to the ODD TPU connector and the EVEN KICprobe to the EVEN TPU connector.

Single KICprobe installations are typically facilitated through the use of a single KICboard, unless the customer specifically requests the purchase of a TPU. On the rare occasion that a single KICprobe is used in conjunction with a TPU, the KIC software is used to designate which connection (i.e., ODD or EVEN) is being used. In this case the software setup is adjusted to accommodate the hardware setup.

As with all devices connected to the TPU, it's important to be careful when attaching or removing the KICprobe connectors. Each KICprobe connector includes two small screws used to ensure a positive connection to their respective ports. They must be

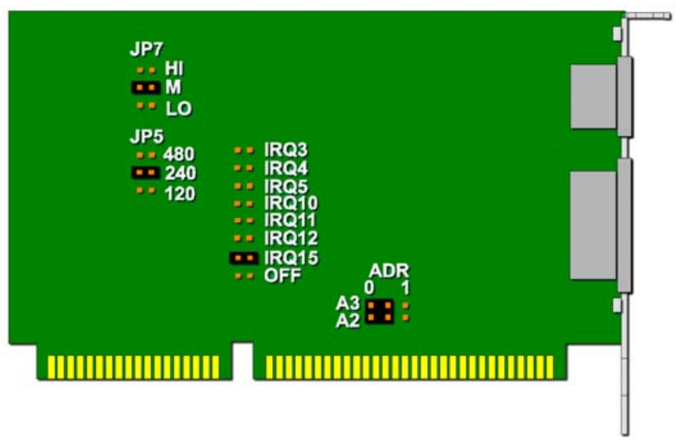
backed out prior to removing the connector. Ensure that the cables are only removed by firmly grasping the connectors and pulling straight out.

Installation

To install the KICboard or Quick-KIC card:

- Ensure that you are properly ground to prevent inadvertent electrostatic discharge damage to both the card and the computer.
- Ensure that all jumpers on the card are correctly configured for the desired setup.

  This may involve taking a complete inventory of the computer interrupts prior to installing the card. This can be accomplished through the use of a program such as Microsoft Diagnostics (MSD.EXE).
- Remove all electrical power from the computer.
- Remove the computer cover.
- Locate an empty 16 bit bus slot on the computer motherboard.
- Remove this slots back-plate cover.
- Insert the card into the 16 bus slot and fasten the card's back-plate to the computer.
- Replace the computer cover.
- Turn the computer on.
- Using the KIC software, setup the KICboard(s) or Quick-KIC card in the KICboard section of the Hardware Input Monitor dialog box.



Ensure that you select only the IRQ you assigned on the card's JP6 jumper. If you accidentally select an interrupt for another device that the computer is currently using (such as a mouse), the computer may freeze-up.

If this happens, the easiest way to recover from this is to reboot the computer and delete the WINKIC.INI file located in the WinKIC directory prior to running the KIC software. This will reset the Setup Hardware settings to their defaults and allow you to try your setup again.

Calibration

The suggested calibration frequency cycle for the Quick-KIC card and KICboard is 6 months. We recommend that it be performed at least annually.

Amplifier offsets, zero offsets, and linearization are performed in software so all that is required for system calibration is AD span and linearity adjustments. The inputs to the AD converter are multiplexed in time through a single instrumentation amplifier. This means that if one channel is calibrated, all of the others will also be calibrated.

To properly perform this procedure, you'll need a thermocouple simulator and possibly a digital voltmeter. Throughout this procedure the Fahrenheit scale is used.

Additionally, because of the nature of the card's location (inside the computer) it should be thoroughly cleaned of dust and other foreign matter prior to attempting the calibration procedure. The use of de-ionized air of no more than 30psi can be used to dislodge dust from the surface as well as underneath card components.

Use a ground-strap when handling the KICboard to prevent inadvertent static electrical charges from damaging the board. Calibrate the AD Span and Linearity adjustments ONLY!

PRIMARY CALIBRATION METHOD

To calibrate the Quick-KIC card or KICboard within ±3.6°F (±2.0°C), perform the following procedure:

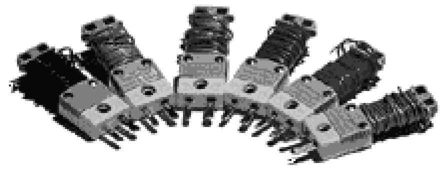
- With power OFF, remove the computer cover.
- Turn ON the computer power and allow the computer to stand for at least 30 minutes, in a constant ambient environment free of drafts.
- Start the KIC software.
- Turn off all Product thermocouples except number one on the KIC software.
- Attach the Thermocouple Extension cable to the Product Thermocouple Connector on the Quick-KIC card of KICboard.
- Connect the thermocouple simulator to TC1 on the Quick-KIC card of KICboard Traveler input connector.
- Set the thermocouple simulator to the maximum temperature you expect to read in your oven. Observe the display of Product TC #1's temperature on the screen. This display should update rapidly.
- Adjust the span potentiometer (R4) very slowly until this maximum temperature is correct.
- Set the thermocouple simulator to below room temperature (40°F ~ 65°F).
- Adjust the linearity potentiometer (R5) very slowly until this low temperature is correct.
- Repeat these steps until both temperatures are reading correctly. When both temperatures are reading correctly, the Quick-KIC card or KICboard is calibrated.

ALTERNATIVE CALIBRATION METHOD

- Select volts x 10 on the voltmeter.
- Place one probe tip on TP1 and the other on TP2.
- Adjust the span potentiometer until the voltage between test points TP1 and TP2 is 2.275 volts.

- Select volts x 1 on the voltmeter.
- Place one probe tip on TP3 and the other on TP4.
- Adjust the linearity potentiometer until the voltage between test point TP3 and TP4 is 12 millivolts.
- Perform these steps until the correct values are achieved and stabilized.
- Once you've achieved the correct voltages, return to the initial procedure to calibrate the temperatures on the KICboard.

Thermocouples



K-type thermocouples are included with each Thermal Management system. The thermocouples are color coded for easy identification and use standard male SMP connectors for easy connection.

The standard wire size for the color coated thermocouples is 30 AWG. These thermocouples have been specifically designed for soldering processes and can be soldered directly to a printed circuit board with 10-88-2[3] solder (eutectic=261°C) without melting the insulation.

ATTACHING THERMOCOUPLES TO THE PRODUCT

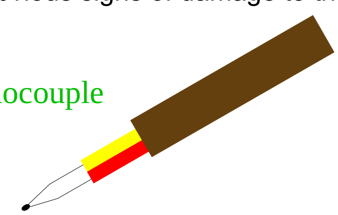
When selecting a board to use for profiling, it's best to use one that resembles the actual product as close as possible. A "dummy" board, which is usually a failed product, is probably best.

Note: If you have the luxury of creating a "golden" board used for temperature profiling, this is obviously the best route. The use of the golden board will eliminate human caused variances in the temperature data by ensuring that the thermocouples used to acquire the data are located in the exact same positions, time after time (i.e., repeatable).

The thermal mass of the product is crucial. If your product has large devices (i.e., small transformers, large capacitors, heat-sinks, etc.) mounted, then temperature deltas will become a real issue when trying to create a suitable temperature profile.

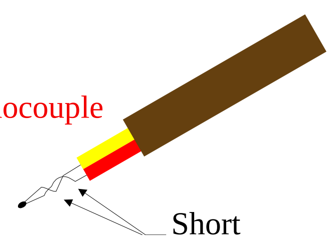
Before attaching any thermocouples on the product, check the integrity of the thermocouple wire and tip. This will save you time and headaches later. Perform a visual inspection of the wire's insulation, checking for obvious signs of damage to the TC's exterior. If the thermocouple's end is twisted, or otherwise making contact (shorted) by anything other than the tip or bead then either replace or repair it.

Good Thermocouple



To perform a functional check of the thermocouple, simply touch the tip with your finger and observe an increase in the temperature on the screen. Do not use the thermocouple if it does not respond to readily apparent temperature changes.

Bad Thermocouple



When using high temperature solder, such as 10-88-2[4], you'll need a fine-tipped soldering iron that can provide the 268°C temperature needed to

[3] 10% Tin (Sn), 88% Lead (Pb), and 2% Silver (Ag)

[4] 10% Tin (Sn), 88% Lead (Pb), and 2% Silver (Ag)

successfully flow the solder. You MUST remove all other solders (i.e., 63-37) from the work PRIOR to applying the solder used to attach the thermocouples. Mixing solder compositions will result in un-definable bonding strengths as well as eutectic values.

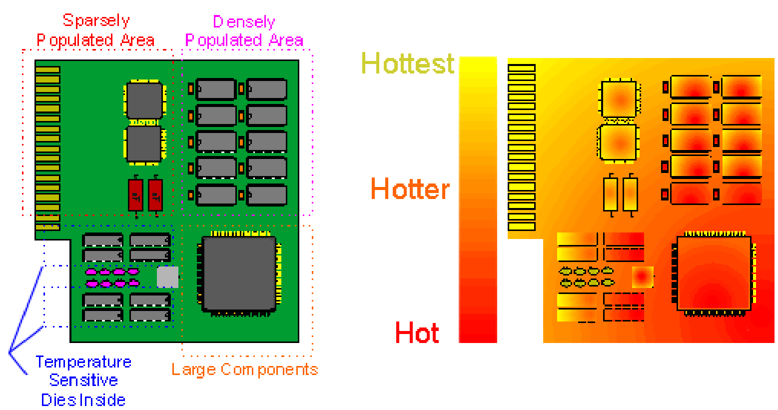
Note: When using 10-88-2 solder, if you make a mistake you'll need to remove the initially applied solder with a solder removal device or copper wick prior to attempting a second application.

It may be best to use as many thermocouples on the profile board as practical. With a good placement strategy, this will provide you with "contingency" information without having run more profile passes.

POSITIONING THE THERMOCOUPLES

Selecting where to place the thermocouples on the profile board is extremely important. These positions, including their justifications, should be documented in your process standard. The goal is to find the highest and lowest peak temperatures and monitor sensitive components. Here are a few suggestions:

- Two thermocouples placed at opposite corners of the board.
- A thermocouple placed at or near large SMT components.
- Thermocouples placed at or on the board surfaces (both top and bottom).
- A thermocouple placed directly on (or in) the most vulnerable SMT component on the board.
- A thermocouple implanted into a vulnerable IC (i.e., directly onto the surface of a die).



This illustration shows an example of a printed circuit board with areas on the board that are either temperature sensitive or prone to temperature differentials.

A preliminary analysis of the board shows:

- A densely populated area (outlined in purple) which will take more time to reach the same temperatures that the sparsely populated area (outlined in red).
- The largest component on the board, a 64 lead PLCC, will also be more challenging to heat uniformly with the rest of the board.
- On the lower left portion of the board are eight SOJ DRAM devices (outlined in blue). The dies within these devices are susceptible to temperature damage.
- Finally, the upper left portion of the board is not only sparsely populated, but also contains an edge connector. The edges of the board will usually heat first,

allowing the heat to “creep” towards the center of the board with time. This particular area of the board will be prone to heat damage.

If we could view a thermograph of this board at it’s peak temperatures in a reflow oven, it might look like the illustration on the right. Notice how the upper left corner of the board is apparently hotter than the lower right corner.

This particular example may spell damage in the form of board warpage due to the excessive temperature delta across the board. With board warpage comes component offsets in the X, Y, Z and theta axis’s.

MATERIALS USED TO ATTACH THERMOCOUPLES

KIC highly recommends the use of 10-88-2[5] high temperature (eutectic=268°C) solder for attaching the thermocouple tips to package leads on the product. This solder melts well above that of most solder pastes used for surface mount applications.

Note: When using high temperature solders, ensure that the old low temperature solder is completely wicked off the joint before attempting to attach the thermocouple tip.

Adhesives should be used when it is impractical or impossible to use soldering techniques. Attaching a thermocouple to the PWB surface (without a pad) or embedded within a device package would be examples of when it is more appropriate to use an adhesive material. Most adhesives materials dispensed at the pick-and-place process are good candidates for use because of their sturdy bonds and their comparable thermal coefficients to solders once they’re cured properly.

Note: The use of adhesives will almost always require an appropriate cure time and temperature in order to ensure that the adhesive is properly bonding.

The use of high temperature tapes, such as Kapton tape, is not recommended for use as a means for attaching the thermocouples.

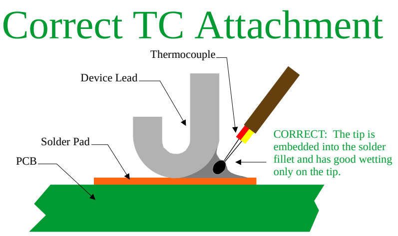
- In an infrared predominant oven the tape will effectively shadow the thermocouple, causing the indicated temperature to fall well below the actual temperature.
- In a forced convection predominant oven the tape may prevent convection currents from effectively transferring the heat to the thermocouple, again, causing the indicated temperature to fall below the actual temperature.
- In a vapor phase soldering process, the tape will loose it’s bond when exposed to the 215ºC fluid/vapor.

Employing the use of tapes for the purpose of securing excessive thermocouple wiring is okay, as long as you bare in mind it’s limitations and possible side-effects.

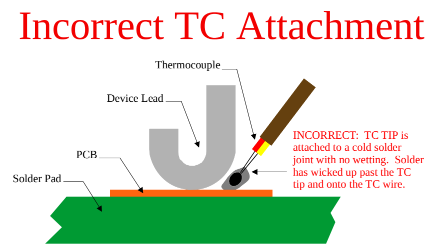
Note: If you’re using thermocouples purchased through KIC, stowing the excess wire should not be an issue. Simply wrap the excess wire around the back end of the connector.

[5] 10% Tin (Sn), 88% Lead (Pb), and 2% Silver (Ag)

METHOD OF ATTACHING THERMOCOUPLES



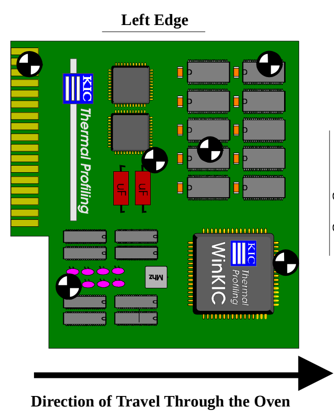
The blow illustration shows an example of how a thermocouple tip should be attached to a solder joint. The joint should have a good fillet with the tip of the thermocouple embedded just inside. The solder should not bridge across or wick up the thermocouple wire.



In contrast, the bottom illustrations shows a poor thermocouple attachment. The solder joint is non-existent, and the solder has wicked up the thermocouple wire causing a potential for erratic and/or intermittent temperature readings. This thermocouple will likely depart the board during the profile.

MEASURING THE THERMOCOUPLE POSITIONS

Once the thermocouples have been attached to the profile board, their locations should be measured and documented accurately. The diagram below shows a profile board with the locations of the thermocouples marked.

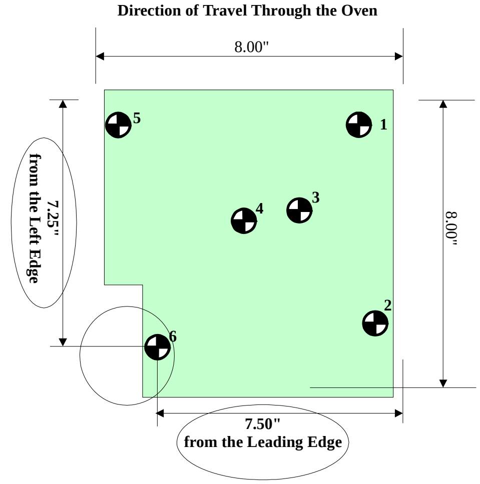


When measuring the thermocouple positions, two points of reference are used:

- **Distance from the Left Edge**
- **Distance from the Leading Edge**

The leading edge will always be the front edge of the board as it travels through the oven. The left edge of the board, of course, will be located in reference to the leading edge.

Note: The KIC software's Setup Product dialog box provides a button that permits rotation of the board in 90° increments without the need to re-enter the data.



Try and use the same scale that you used when measuring your oven (the example is using inches). It's not absolutely necessary, but it may prevent transposition errors from occurring when entering the data.

Use the format shown at the bottom of the map diagram as a means for collecting the thermocouple map data.

TC No.	Left Edge	Leading Edge	Location Name
1	0.50"	0.75"	SOJ Die
2	7.00"	0.50"	PLCC Lead (outer edge)
3	3.00"	2.75"	SOJ Lead
4	4.75"	4.00"	Cap
5	0.50"	7.50"	Edge Connector
6	7.25"	7.50"	Cap

Once again, these thermocouple positions, and the devices they're attached to should be documented in your products manufacturing documentation.

The following is a brief description of the thermocouple placements on the example board in.

TC# **LOCATION**

1. On an outside lead of the large PLCC.
2. Inside the SOJ device, placed on top of the die.
3. On an inside lead of the large PLCC.
4. On the solder joint of a chip capacitor in the middle of the board.
5. On an outside lead of an SOJ, in the upper left corner of the board.
6. On the printed circuit board surface, in the lower left corner of the board. (this TC can also be placed directly on one of the edge connectors.

These placements should be adequate for our application. Temperature data for the inside/outside and opposing corners (vertically, horizontally, and diagonally) are being collected. These data will enable us to analyze the temperature deltas (differences) between critical locations on the board.

Furthermore, the temperature at the inside of the large PLCC is also being monitored. We've hypothesized this to be the coldest part of the board during the reflow process.

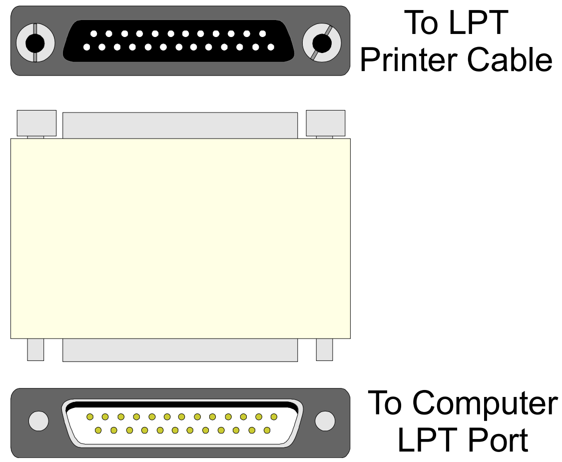
The profile for this product thermocouple will be scrutinized for it's duration above key temperatures. Not only will it lag in temperature increase (positive slope), but it will also lag in temperature decrease (negative slope) as well.

Product thermocouples #2 (mounted atop the SOJ die) and #4 (mounted on a chip capacitor solder joint) are there to ensure that the temperatures do not exceed a maximum temperature, and the duration above a specified temperature.

If either of these limitations are exceeded, the device may fail immediately or worse, fail prematurely after being purchased by your customer.

Note: Thermocouples using a wire size of 36 AWG are also available upon request, but are not color coated.

Software Key Option



Referred to as a “dongle” in some circles, the Software Key is used to enable value added features of the KIC software. The Software Key is attached directly to the printer port (LPT1:, LPT2:, etc.) between the port and the printer cable (if used).

Note: Special software drivers for WinNT, Win3.1, Win95, and OS2 are included during the KIC software installation that prevent port conflicts during printing when the Software Key is present.

This Software Key is only provided when a combination of any one or more of the following optional features are purchased:

- **Auto-Predict** – This option is used to automatically predict profiles based on your process specification.
- **Live Data Output** – This option allows real-time output of the KIC software’s data.
- **Board Sensors** – This option supports traceability information of the oven’s load condition and real-time board counting and totalization.
- **Barcode Reader** – This option supports traceability information for each product processed via barcodes labels attached to the boards.
- **QC-Calc™ SPC** – This option is a real-time, automated SPC package[6] with a customizable report generator.

To use any of the above features, a specially encrypted code onboard the Software Key must be enabled and the Software Key attached to the printer port. Removal of the Software Key during the KIC software’s operation will result in the loss of a given features use.

Note: These are the only items in the KIC software that are protected through the use of the Software Key. All other features of the KIC software will still function normally, with or without the Software Key present.

KIC Thermal Profiling can “upgrade” the features enabled/disabled on your Software Key(s) via an executable files that can be sent through the e-mail. Contact KIC Sales for more information about upgrading.

[6] The Live Output feature must first be enabled in order to use the QC-Calc SPC package.

SlimKIC and SlimKIC-II Thermal Profilers

The SlimKIC and SlimKIC-II Thermal Profilers are an electronic data acquisition device with internal memory for data-logging and/or radio transmission capabilities for real-time profiling.

This device can acquire data from up to 12 thermocouples, perform data readings up to 60 per second, and log over 60,000 temperature readings.

The SlimKIC is purchased in one of three models:

- SlimKIC Data Logger
- SlimKIC Transmitter
- SlimKIC Transmitter/Data Logger

SPECIFICATIONS

Accuracy – ±2ºF (±1.2ºC)

Maximum Internal Operating Temperature – 100ºC

Thermocouple Compatibility – K Type only

Temperature Range – -150ºC ~ 1050ºC[7]

Maximum Readings per Second for Data Logger Function – 20 ~ 60

Maximum Readings per Second for Data Transmission – 7.5 ~ 20

Computer Compatibility – AT or MicroChannel

Dimensions – 8.5"L x 3.0"W x 0.75"H

Power Requirements – 9-volt Alkaline Battery

INSIDE THE SLIMKIC

The listed components may be useful for the Field Engineer to know:

- **SW1** – This two position switch is the SlimKIC power switch. Place the switch in the UP position to apply power, DOWN to remove power.
- **SW2** – This three position switch is the profile start/end switch. This switch is spring-loaded in the center, or null position.

  Placing this switch in the momentary UP position will force the SlimKIC to transmit a "start" signal to the Thermal Receiver. If the SlimKIC has data-logging capabilities enabled, lifting this switch will additionally clear the onboard RAM and begin writing temperature data to it.

[7] The SlimKIC can monitor temperatures up to 1050ºC, but must use special high temperature thermal shields or trailing wire temperature thermocouple wires.

Placing this switch in the momentary DOWN position will force the SlimKIC to transmit an "end" signal to the Thermal Receiver. This will not force the SlimKIC from collecting further data, but only allow the KIC software to perform certain timing calculations associated with the oven's belt-speed.

- **U12** – This PROM contains the instruction set that allows the SlimKIC to communicate with the KIC software. Sometimes changes are made in the KIC software that may necessitate the removal and replacement of this chip.

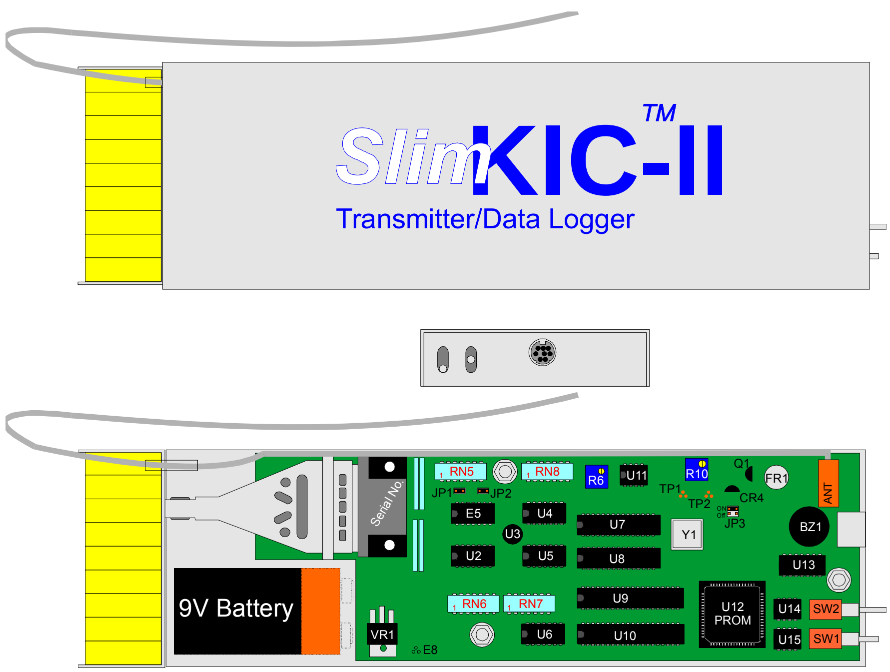
  Note: Always use the proper IC extractor for removing this device. Damage to the PROM socket may result if other methods are used.

- **R10** – This is the CALIBRATE potentiometer, and is the only adjustment on the SlimKIC used for calibrating the unit.
- **R6** – This is the MAX TEMP potentiometer. This is used to increase or decrease the upper range of temperatures that the SlimKIC can read.
- **JP1** and **JP2** – These jumpers are normally closed to provide an RC (resistance/capacitance) circuit for the first and second thermocouples, respectively. Normally, RC filters are used on all of the thermocouple channels.

  By opening JP1 and/or JP2, their RC filters are removed from the circuit which will in turn remove the small time delay in the data being picked-up by thermocouples #1 and/or #2. This capability allows you to perform very accurate solder pot dwell time checks using thermocouples #1 and/or #2 when removed.

- **JP3**– This jumper provides a hardware means of enabling or disabling the transmitter function of the SlimKIC. With pins 1 & 4 jumped (closed) the transmitter is ON, or enabled. With pins 2 & 3 jumped (closed) the transmitter function is OFF, or disabled.

  This jumper should be used when you alternate between running transmitted profiles through a conveyorized process and data-logged profiles on a static process.



This is the only approved method for disabling the transmitter function. Removal of the transmit antenna from it's receptacle will not disable the transmitter function, but may damage the unit.

- **Communication Port** – This is an 8 pin female Mini-DIN connector used to connect the SlimKIC to the computer COM port via the direct connect cable.

  This setup serves two purposes:

  1. Allows you to download information from the SlimKIC's RAM when used as a data-logger.
  2. Establishes two-way communications between the SlimKIC and the computer for the purposes of setting up the data collection parameters inside the SlimKIC.

- **P1** – This is a 26 pin female connector used to connect a 6, 9, or 12 thermocouple Yoke, or a 6, 9, or 12 thermocouple Harness. These devices can be readily removed and replaced with minimal effort.

SERIAL NUMBER LOCATION

The serial number of the SlimKIC is etched atop the P1 connector. This is the connector that the thermocouple yoke or harness plugs into.

FREQUENCIES USED BY THE SLIMKIC AND SLIMKIC-II TRANSMITTERS

The SlimKIC and SlimKIC-II Thermal Profilers, when purchased with the transmitter option, will use one of the following two frequencies:

- 303.875 MHz – SlimKIC Thermal Profiler
- 433.92 MHz – SlimKIC-II Thermal Profiler

These frequencies meet the regulations of the United States Federal Communications Commission (FCC) part 15 and/or part 18. Not all frequencies are available in all countries. The transmission range of the SlimKIC is about 100 feet (30.5 meters) in the open.

Note: This transmission may vary within the confines of your facility. Depending on the structure of the building, the signal may carry further.

Calibration

The suggested calibration frequency cycle for the SlimKIC is 6 months. We recommend that it be performed at least annually.

To calibrate the SlimKIC you will need a thermocouple simulator and possibly a digital voltmeter. Throughout this calibration procedure, the Fahrenheit scale will be used.

Perform the following steps to properly calibrate the SlimKIC within $\pm$1.2°C (+2.0°F):

- Let the SlimKIC stand for at least 30 minutes, with it's power on, in a constant ambient environment free of drafts.
- Turn on the computer and start the KIC software.
- Connect the SlimKIC to the computer with the direct connect cable.
- On the KIC software's main screen, turn off all product thermocouples except number one.
- Connect the thermocouple simulator to the TC1 position on the SlimKIC.
- Set the thermocouple simulator to the maximum temperature you expect to read in your oven. Observe the display of Product TC #1's temperature on the TC button bar. This display should update rapidly.

- Adjust the Calibrate potentiometer very slowly until this maximum temperature is correct.
- Set the thermocouple simulator to below room temperature (40°F ~ 65°F).
- Adjust the Calibration potentiometer very slowly until this low temperature is correct.
- Repeat these steps until both temperatures are reading correctly. When both temperatures are reading correctly, the SlimKIC is calibrated.

Setting the Maximum Temperature

The “maximum temperature” setting for the SlimKIC refers to the highest temperature that the SlimKIC is set to read. When shipped, the SlimKIC is preset for 932°F (500°C) as it’s maximum temperature. It can be changed.

To change the maximum temperature setting for the SlimKIC, perform the following:

- Turn on the computer and start the KIC software with the SlimKIC connected to the computer connected via the direct connect cable.
- Turn on your SlimKIC.
- Observe the Hardware Input Monitor. If the Hardware Input Monitor didn’t appear, then select **Hardware** option from the Setup list menu. The number that you’ll be calibrating is the third number from the right on the top line.
- Remove the cover of the SlimKIC and, using a small screwdriver, adjust the MAX TEMP potentiometer very slowly until the desired maximum temperature appears in the Hardware Input Monitor.
- Turn clockwise to decrease the maximum temperature. Turn counterclockwise to increase the maximum temperature.
- After you’ve finished, replace the SlimKIC cover.

SideKIC Thermal Profiler

The SideKIC Thermal Profiling is the predecessor to, and superseded by, the SlimKIC Thermal Profiler. Although it's been out of production for some years now, the SideKIC is still actively supported by KIC Thermal Profiling.

The SideKIC Thermal Profiler has 6 fixed thermocouple inputs and, unlike the SlimKIC, cannot be re-configured for increased thermocouple capacities. Also, the SideKIC is only capable of radio transmission of the temperature data. It cannot store data like the SlimKIC.

The SideKIC uses the same Thermal Receiver that the SlimKIC uses, which can be connected either directly to the computer COM port, or to the TPU Receiver port.

This section includes instructions for servicing the SideKIC only to the extent of calibration. If a SideKIC unit is inoperative, it should be sent directly to KIC for further examination by our technicians.

SPECIFICATIONS

Accuracy – ±2ºF (±1.2ºC)

Maximum Internal Operating Temperature – 100ºC

Thermocouple Compatibility – K Type only

Temperature Range – -150ºC ~ 1050ºC[8]

Maximum Readings per Second for Data Transmission – 7.5 ~ 20

Computer Compatibility – AT or MicroChannel

Dimensions – 8.5"L x 3.0"W x 0.75"H

Power Requirements – 9-volt Alkaline Battery

FREQUENCY USED BY THE SIDEKIC THERMAL PROFILER

The SideKIC Thermal Profiler's transmission frequency is fixed at 303.875 MHz.

This frequency meets the regulations of the United States Federal Communications Commission (FCC) part 15 and/or part 18. The transmission range of the SideKIC is about 100 feet (30.5 meters) in the open.

[8] The SideKIC can monitor temperatures up to 1050ºC, but must use special high temperature thermal shields or trailing wire temperature thermocouple wires.

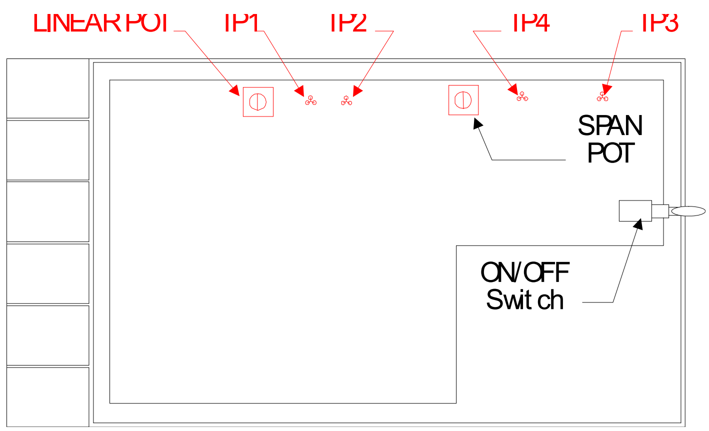
Calibration

The suggested calibration frequency cycle for the SideKIC is 6 months. We recommend that it be performed at least annually.

Amplifier offsets, zero offsets, and linearization are performed in software so all that is required for system calibration is AD span and linearity adjustments. The inputs to the AD converter are multiplexed in time through a single instrumentation amplifier. This means that if one channel is calibrated, all of the others will also be calibrated.

A temperature tracking IC is embedded in the reference block which also contains the cold junctions for all of the thermocouples. The temperature of this IC varies linearly with the absolute temperature so that the temperature of the block in degrees Celsius plus 273 equals 10 times the voltage in millivolts between TP1 and TP2. The linearity potentiometer adjusts this voltage and thereby sets the correct cold junction reference and internal temperature values.

To properly calibrate the SideKIC you will need a thermocouple simulator and possibly a digital voltmeter.



PRIMARY CALIBRATION METHOD

To calibrate the SideKIC within $\underline{+}$2.0°F ($\underline{+}$1.2°C), perform the following procedure:

- Let the SideKIC stand for at least 30 minutes, with the power on, in a constant ambient environment free of drafts.
- Turn ON the computer and start the KIC software.
- On the KIC software's main screen, turn off all Product thermocouples except number one.
- Connect the thermocouple simulator to TC1.
- Set the thermocouple simulator to the maximum temperature you expect to read in your oven. Observe the display of Product TC #1's temperature on the screen. This display should update rapidly.
- Adjust the span potentiometer very slowly until this maximum temperature is correct.
- Set the thermocouple simulator to below room temperature (40°F ~ 65°F).
- Adjust the linearity potentiometer very slowly until this low temperature is correct.
- Repeat these steps until both temperatures are reading correctly. When both temperatures are reading correctly, the SideKIC is calibrated.

ALTERNATIVE CALIBRATION METHOD

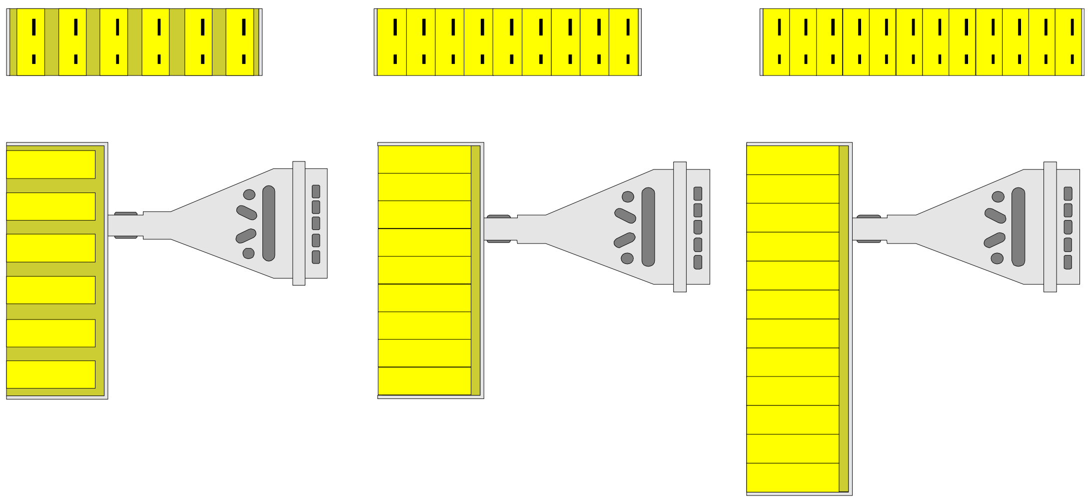
- Select volts x 10 on the voltmeter.
- Place one probe tip on TP3 and the other on TP4.
- Adjust the span potentiometer until the voltage between test points TP3 and TP4 is 2.49 volts.
- Select volts x 1 on the voltmeter.
- Place one probe tip on TP1 and the other on TP2.
- Adjust the linearity potentiometer until the voltage between test point TP1 and TP2 is 29.8 millivolts, with the reference block at 25°C.

  NOTE: Add or subtract 0.1 millivolt for each degree above or below 25 degrees respectively.
- Perform these steps until the correct values are achieved and stabilized.
- Once you've achieved the correct voltages, return to the initial procedure to calibrate the temperatures on the SideKIC.

Thermocouple Yokes

Thermocouple Yokes are replacement or alternative modules that provide a receptacle for the thermocouples to connect to the SlimKIC Thermal Profiler. These Yokes come in configurations made to support either 6, 9 (standard), or 12 thermocouples.

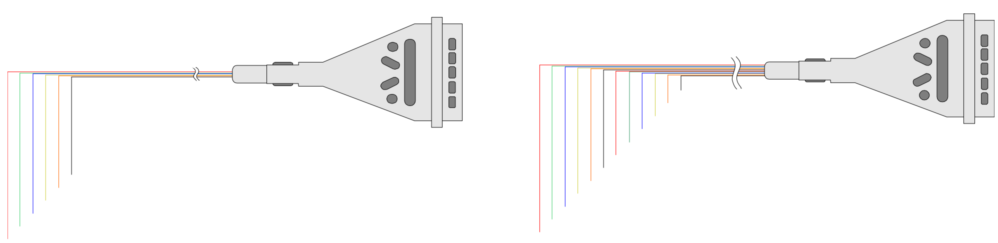
Note: Simply attaching a Thermocouple Yoke of larger capacity to the SlimKIC thermal Profiler will not necessarily increase the capability of the unit. Contact KIC Sales for information about increasing the capability of your SlimKIC Thermal Profiler.



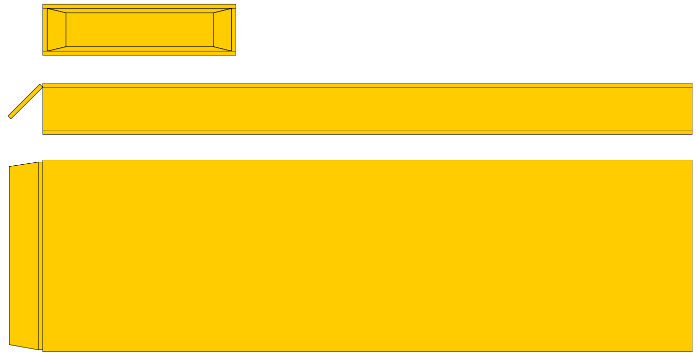
Thermocouple Harnesses

If you have the luxury of creating “golden” or standardized profiling boards for your products, the Thermocouple Harness offers an added advantage of attaching the thermocouples to the board and having only one connect point, rather than 6, 9 or 12 attachments. Additionally, the total mass of the SlimKIC Thermal Profiler is reduced because no Yokes are used.

Thermocouple Harnesses come in the typical arrangements of 6, 9 or 12 thermocouples, with or without color coding.



Thermal Shields



To protect the SlimKIC and SideKIC Thermal Profilers from internal heat damage, shields are employed to dramatically impede the transfer of heat to the inside of the profiler.

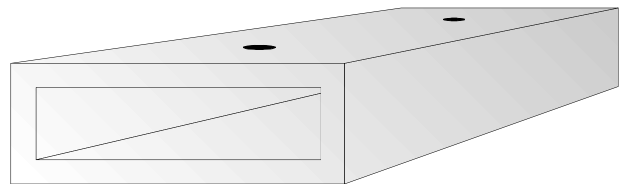
Although the internal temperatures of the SlimKIC and SideKIC Thermal Profilers are rated up to 100ºC, minimizing the exposure of the electronics to temperature extremes can help increase the life of the profiler.

These shield types are constructed of a special material that impedes heat transfer, but also remains cool to the touch immediately upon exiting the oven.

SPECIFICATIONS

Maximum Minutes @	**Bare SlimKIC 8.5"l x 3.0"w x 0.75"h**	**Standard Shield 12"l x 3.3"w x 1.1"h**	**Long Duration Shield 14"l x 5.5"w x 3.2"h**
300ºF (150ºC)	12.7	17.1	82
400ºF (205ºC)	7.5	10.3	55
500ºF (260ºC)	5.5	7.9	40

Water Shields



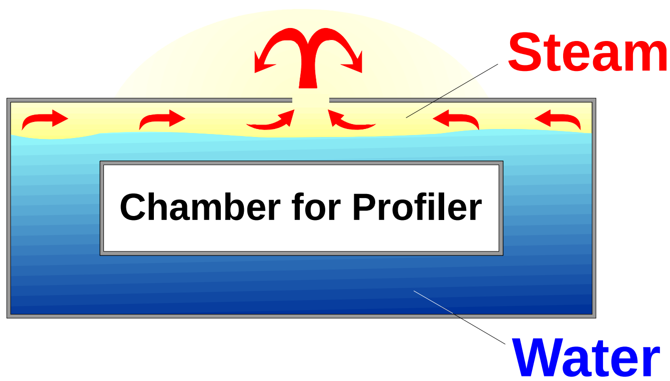
Water Jackets are a special type of shield that utilizes water as the primary means of impeding the heat transfer rate into the SlimKIC or SlimKIC-II Thermal Profiler. Once the water reaches it's boiling point of about 100ºC, the water will remain at this temperature while the water transforms from a liquid to a gaseous state.

The SlimKIC Thermal Profiler inside the Water Jacket will be surrounded by a "blanket" of water that will remain at 100ºC until the water completely boils off.

The SlimKIC Thermal Profiler has been repeatedly tested at internal temperatures of 100ºC under continuous, nonstop operations with no major side-effects or loss of function.

Because the water chamber of the Water Jacket will contain hot water when the unit is extracted from the oven, it is extremely important that the unit be handled with a hot glove and maintained in an upright position until the water inside has cool.

Note: Never attempt to empty the water from this unit while the water is hot.



SPECIFICATIONS

The following time specifications are from room temperature to 200ºC:

- 11.5"L x 4"W x 2'H x 414 milliliters – 91 minutes
- 12"L x 4"W x 2"H x 473 milliliters – 96 minutes
- 12"L x 4.5"W x 1.5"H x 177.5 milliliters – 60 minutes

Thermal Receivers

These units, when attached through a TPU, allow temperature information transmitted from either the SlimKIC or SideKIC to be received via the TPU.

This feature allows more flexibility during the profiling process because real-time information is being provided to the KIC software, but no trailing wires have to be attended to, as with the Thermocouple Extension cable.

The Thermal Receiver is the device that listens for data transmissions from the SlimKIC or SideKIC and relays this data to either the TPU or straight to the computer COM port. A Thermal Receiver is shipped standard with all SlimKIC and SlimKIC-II Transmitters.

There are 3 models of Thermal Receivers currently is use:

- **303.875Mhz (older model)**[9] – Used only with the standard SlimKIC or SideKIC Transmitter
- **303.875Mhz (newer model)** – Used only with the standard SlimKIC or SideKIC Transmitter
- **433.92Mhz** – Used exclusively with the SlimKIC-II Transmitter

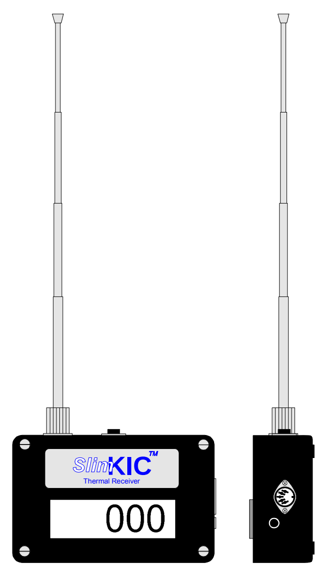
	SideKIC	SlimKIC	SlimKIC-II
303Mhz (older)	YES	YES	NO
303Mhz (newer)	YES	YES	NO
433Mhz	NO	NO	YES

Thermal Receiver Compatibility

Any combination of these Thermal Receivers may be mixed when employed on a KIC-Link network, but it is important to ensure that the correct model of SlimKIC is being used to transmit the data.

Thermal Receiver - 303Mhz (older)

The 303Mhz Thermal Receiver unit is a small black box with a telescoping antenna, a LCD panel. A button[10] located on top of the unit is used to start profiles. The side of the box has a communication cable connector and a belt speed check cable connector.



Front Side

SPECIFICATIONS

Power Supply – The AC power supply shipped with the Thermal Receiver is a class 2 step-down transformer, and

[9] This unit has been superseded by a newer model of 303.875 Thermal Receiver and is no longer actively manufactured. However, it is still actively supported.

[10] Not used when boards sensors are installed and the receiver communication is routed through a TPU.

will convert normal 120VAC/60Hz/6W power to 12VDC/300mA.[11]

Antenna – 12” retractable

Dimensions – 4”L x 3.8”W x 1.6”H

Computer Compatibility – AT or MicroChannel

Start Button – A momentary press switch located on the top. This button normally starts a profile.

Communication Cable Connector – A female DIN-6 connector that allows the connection to either a TPU or the computer COM port.

Belt Speed Check Cable Connector – A single pin jack that allows connection of the Belt Speed Check Button cable. This button is normally[12] pressed at the end of the profile to measure the conveyor speed.

LCD Panel – An LCD readout that shows the signal reception strength. The strength of the signal reception is highly dependent on the receiver antenna length and orientation, as well as the receiver’s physical location.

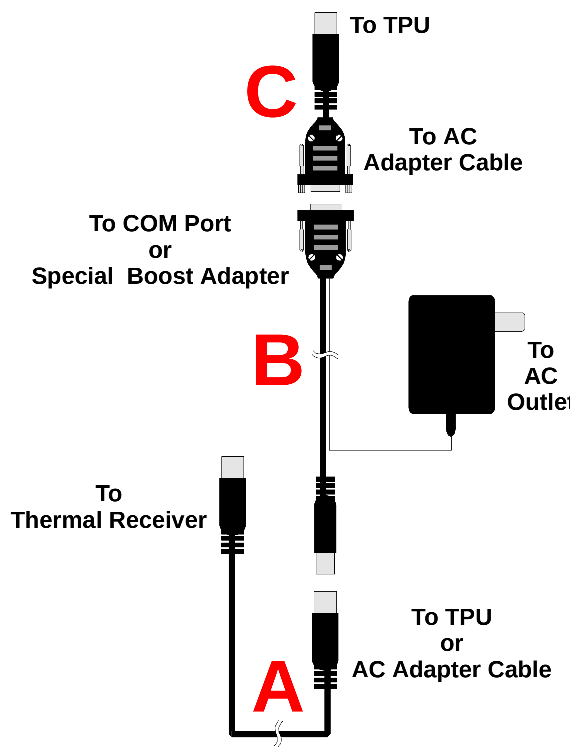
303MHZ (OLD MODEL) THERMAL RECEIVER CABLING

The old model of 303Mhz Thermal Receiver has three basic cables:

A. A single cable with a 5-pin male DIN connector at each end.

B. An twin cable with 9-pin male RS-232 interface at one end, a 5-pin female DIN connector at the opposite end, and an AC adapter cable that also runs into the RS-232 connector.

C. A special adapter for providing increased electrical power to the Thermal Receiver.



TPU ATTACHMENT (NORMAL)

Cable **A** is used to connect the Thermal Receiver directly to the Receiver port of the TPU. In this configuration, the Thermal Receiver draws it’s electrical power directly off the TPU.

TPU ATTACHMENT (BOOSTED)

Cable **A** is used to connect the Thermal Receiver to AC Adapter cable **B**. AC Adapter cable **B** is then connected to the TPU via the special connector **C**. The AC Adapter is plugged into an AC outlet. This configuration provides AC power directly

[11] This AC adapter may not be appropriate in all countries, but a suitable replacement can be used if the output power is maintained at 12VDC/300mA.

[12] Not used when boards sensors are installed and the receiver communication is routed through a TPU.

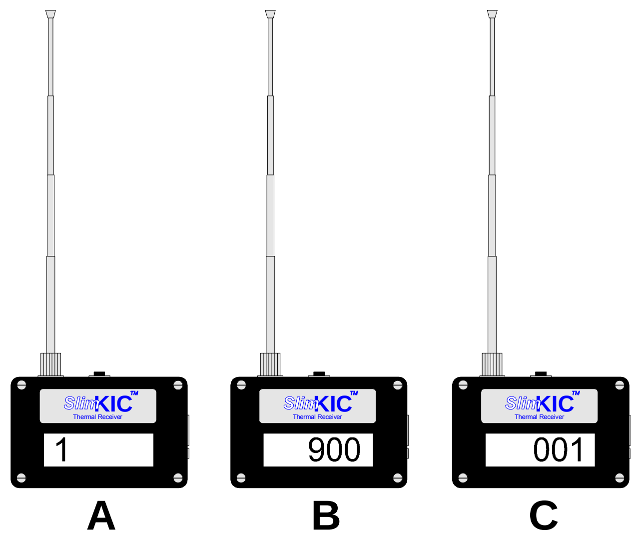
from a wall outlet rather than the TPU power supply, and can oftentimes help provide improved reception on the Thermal Receiver when connected to the TPU.

COMPUTER COM PORT ATTACHMENT

Cable **A** is used to connect the Thermal Receiver to AC Adapter cable **B**. AC Adapter cable **B** is then connected directly to the computer COM port. The AC Adapter is plugged into an AC outlet. This configuration provides AC power directly from a wall outlet to the Thermal Receiver when connecting it to the computer.

303 RECEIVER (OLD MODEL) OPERATION

The illustration below shows three examples of older style 303 Thermal Receivers (labeled A, B, C):



A. This receiver's signal strength is at or above the maximum signal strength, annotated by the number 1 in the left most portion of the LCD display. This is the best signal. Ideally, this is what you would like to see on the receiver while running profiles.

B. This receiver's signal strength is reading 900. This is about a medium strength signal. Although not maximum, this signal can easily provide reliable data reception. In reality, it is not uncommon for the signal strength to move back and forth between the readings in both A and B.

C. This receiver's signal strength is minimal. The data integrity is gone because the signal is simply not strong enough to support it. To alleviate weak reception, ensure that the antenna is extended to it's full 12 inches and/or relocate[13] the receiver to a better location on the oven.

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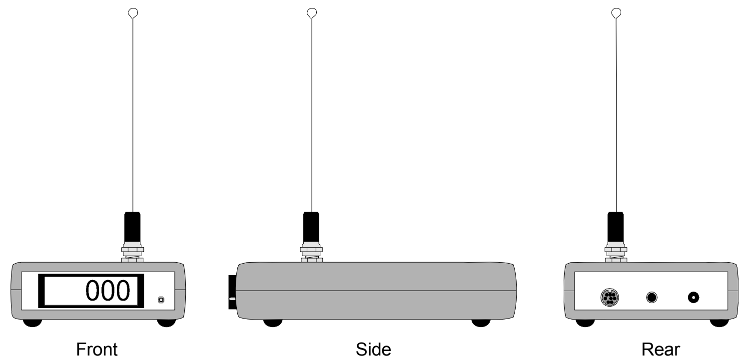
[13] Experience has shown that the top of the oven is a very good spot to station the receiver.

303Mhz Receiver (newer model)

This model of Thermal Receiver supercedes the old 303 Thermal Receiver (black box) and can be used with the SideKIC and SlimKIC Thermal Profiler.

Note: It cannot be used with the SlimKIC-II Thermal Profiler.



SPECIFICATIONS

Power Supply – The AC power supply shipped with the Thermal Receiver is a class 2 step-down transformer, and will convert normal 120VAC/60Hz/6W power to 12VDC/500mA.[14]

Antenna – 9.75", fixed length

Dimensions – 7.75"L x 4"W x 2.25"H

Computer Compatibility – AT or MicroChannel

Start/Stop Switch – A 3 position, momentary press switch located on the face of the front panel. This button is normally[15] used to start a profile.

Communication Cable Connector – A female mini-DIN connector that allows the connection to either a TPU or the computer COM port.

Belt Speed Check Cable Connector – A single pin jack that allows connection of the Belt Speed Check Button cable. This button is normally pressed at the end of the profile to measure the conveyor speed.

LCD Panel – An LCD readout that shows the signal reception strength. The strength of the signal reception is highly dependent on the receiver antenna length and orientation, as well as the receiver's physical location.

303MHZ (OLD MODEL) THERMAL RECEIVER CABLING

The new model of 303Mhz Thermal Receiver comes with three basic cables:

A. An AC adapter cable.

B. A communications cable with a 6-pin male DIN connector at one end and an 8-pin min-DIN connector at the other.

C. A communications cable with a 9-pin female RS-232 interface at one end, an 8-pin male mini-DIN connector at the opposite end.

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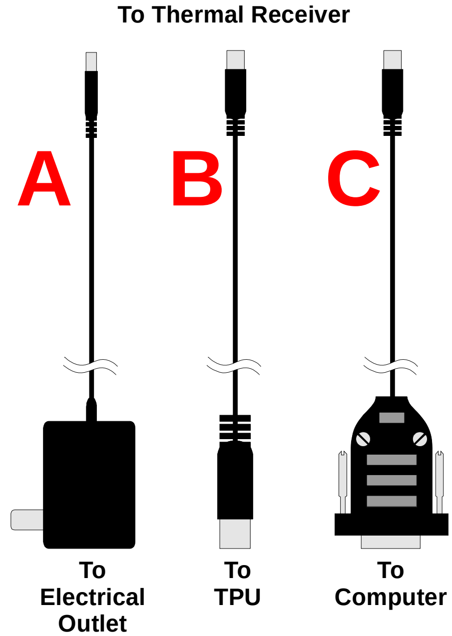
[14] This AC adapter may not be appropriate in all countries, but an suitable replacement can be used if the output power is maintained at 12VDC/300mA.

[15] Not used when boards sensors are installed and the receiver communication is routed through a TPU.

TPU ATTACHMENT

Cable **B** is used to connect the Thermal Receiver directly to the Receiver port of the TPU. In this configuration, the Thermal Receiver draws it's electrical power directly off the TPU.



COMPUTER COM PORT ATTACHMENT

Cable **C** is used to connect the Thermal Receiver directly to the computer COM port. AC adapter **A** is connected to the Thermal Receiver to provide electrical power.

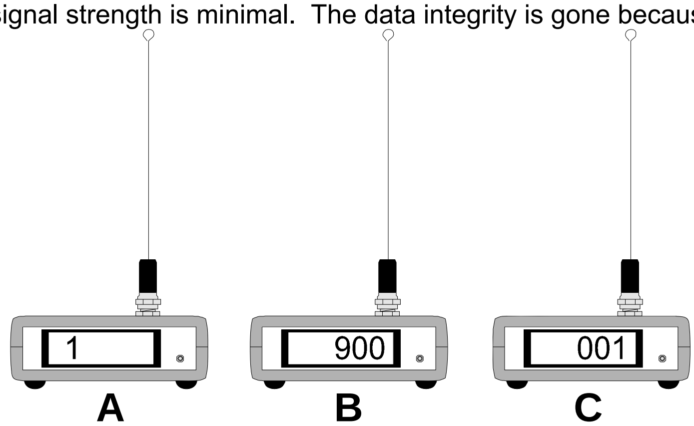
303MHZ RECEIVER (NEW MODEL) OPERATION

The illustration below shows three examples of newer style 303 Thermal Receivers (labeled A, B, C):

A. This receiver's signal strength is at or above the maximum signal strength, annotated by the number 1 in the left most portion of the LCD display. This is the best signal. Ideally, this is what you would like to see on the receiver while running profiles.

B. This receiver's signal strength is reading 900. This is about a medium strength signal. Although not maximum, this signal can easily provide reliable data reception. In reality, it is not uncommon for the signal strength to move back and forth between the readings in both A and B.

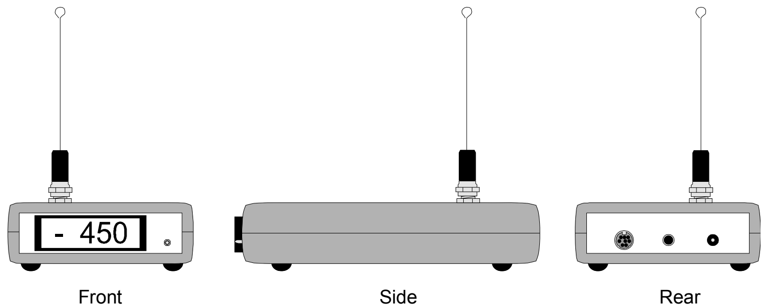
C. This receiver's signal strength is minimal. The data integrity is gone because the signal is simply not strong enough to support it. To alleviate weak reception relocate[16] the receiver to a better location on the oven.



[16] Experience has shown that the top of the oven is a very good spot to station the receiver.

433Mhz Receiver

This Thermal Receiver can only be used with the new SlimKIC-II Thermal Profiler unit.



SPECIFICATIONS

Power Supply –
The AC power supply shipped with the Thermal Receiver is a class 2 step-down transformer, and will convert normal 120VAC/60Hz/6W power to 12VDC/500mA.

Antenna – 6.75”, fixed length

Dimensions – 7.75”L x 4”W x 2.25”H

Computer Compatibility – AT or MicroChannel

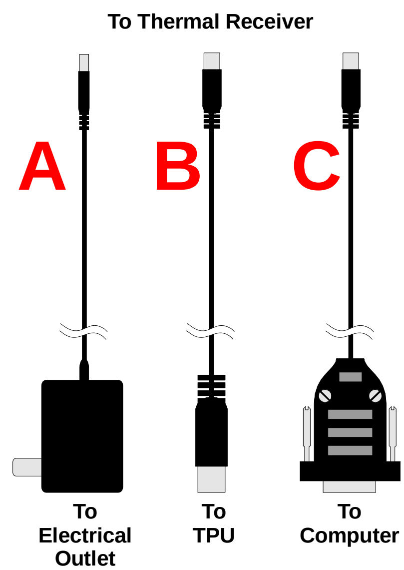
Start/Stop Switch – A 3 position, momentary press switch located on the face of the front panel. This button is normally[17] used to start a profile.

Communication Cable Connector – A female mini-DIN connector that allows the connection to either a TPU or the computer COM port.

Belt Speed Check Cable Connector – A single pin jack that allows connection of the Belt Speed Check Button cable. This button is normally pressed at the end of the profile to measure the conveyor speed.

LCD Panel – An LCD readout that shows the signal reception strength. The strength of the signal reception is highly dependent on the receiver antenna length and orientation, as well as the receiver’s physical location.

433MHZ THERMAL RECEIVER CABLING



The 433Mhz Thermal Receiver comes with three basic cables:

A. An AC adapter cable.

B. A communications cable with a 6-pin male DIN connector at one end and an 8-pin min-DIN connector at the other.

C. A communications cable with a 9-pin female RS-232 interface at one end, an 8-pin male mini-DIN connector at the opposite end.

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[17] Not used when boards sensors are installed and the receiver communication is routed through a TPU.

TPU ATTACHMENT

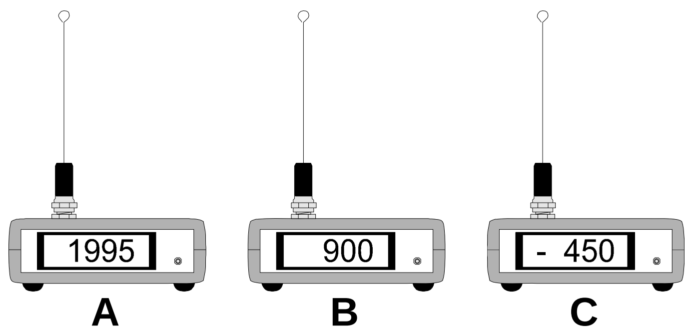
Cable **B** is used to connect the Thermal Receiver directly to the Receiver port of the TPU. In this configuration, the Thermal Receiver draws it's electrical power directly off the TPU.

COMPUTER COM PORT ATTACHMENT

Cable **C** is used to connect the Thermal Receiver directly to the computer COM port. AC adapter **A** is connected to the Thermal Receiver to provide electrical power.

433 RECEIVER OPERATION

The illustration below shows three examples of newer style 303 Thermal Receivers (labeled A, B, C):



A. This receiver's signal strength is at the maximum signal strength, annotated by the number 1995 on the LCD display. This is the best signal. Ideally, this is what you would like to see on the receiver while running profiles.

B. This receiver's signal strength is reading 900. This is about a medium strength signal. Although not maximum, this signal can easily provide reliable data reception. In reality, it is not uncommon for the signal strength to move back and forth between the readings in both A and B.

C. This receiver's signal strength is minimal. The data integrity is gone because the signal is simply not strong enough to support it, or the SlimKIC is not transmitting a signal. To alleviate weak reception relocate[18] the receiver to a better location on the oven.

[18] Experience has shown that the top of the oven is a very good spot to station the receiver.

Setup: TPU with a 303 (old) Receiver

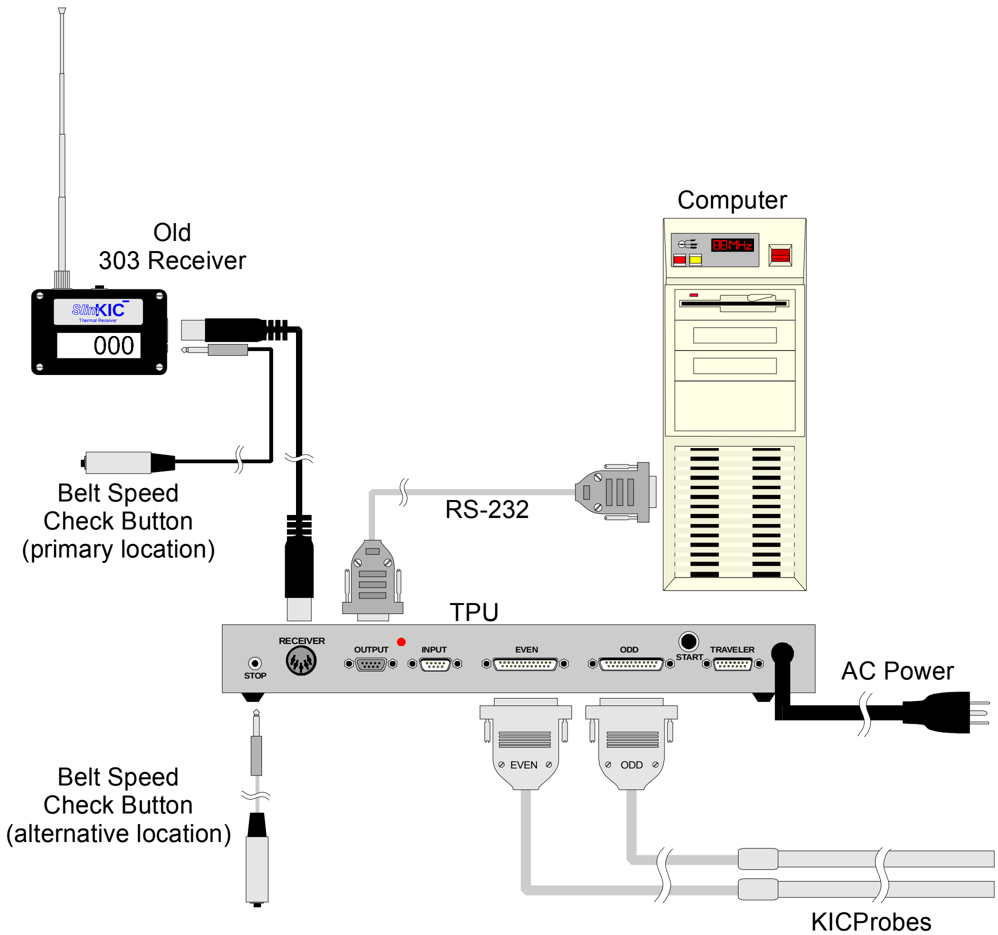
The Thermal Receiver is connected directly to the TPU. The TPU is attached to the computer using a RS-232 connection.

The KICprobes are attached to the front panel of the TPU.

The Belt Speed check button can be connected either directly to the Thermal Receiver, or directly to the TPU.

Either the Start button on the top of the Thermal Receiver or the Start button on the face of the TPU can be used to start a profile.

Note: This is in addition to the F2 key of the computer keyboard and the Start Profile icon on the KIC software toolbar.



Setup: 303 (older 303MHZ) Receiver to Computer

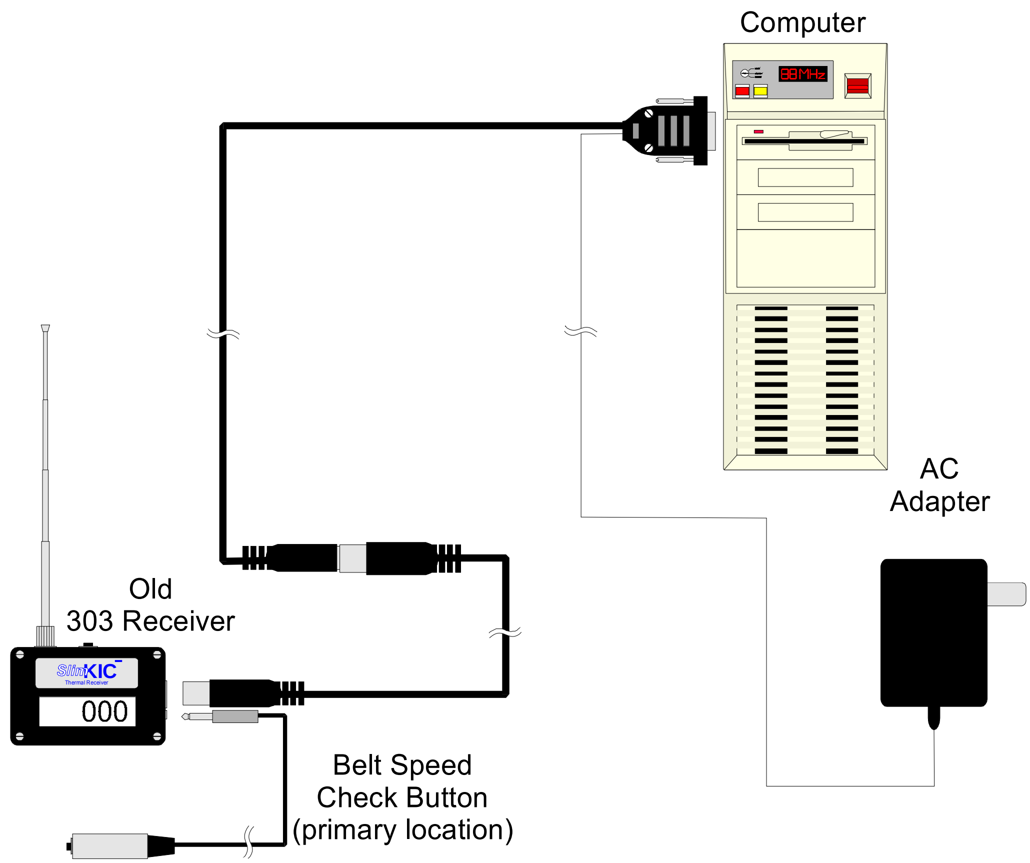
The Thermal Receiver is connected to the AC adapter cable (provided with SideKIC and SlimKIC Thermal Profilers). This AC adapter cable is attached to the computer COM port. The AC adapter is plugged into an electrical outlet.

The TPU is attached to the computer using either a KIC-Link network connection, or a RS-232 (shown) connection.

The Belt Speed check button is connected to the Thermal Receiver.

The Start button on the top of the Thermal Receiver is used to start a profile.

Note: This is in addition to the F2 key of the computer keyboard and the Start Profile icon on the KIC software toolbar.



Setup: TPU and Externally Powered 303 (old) Receiver

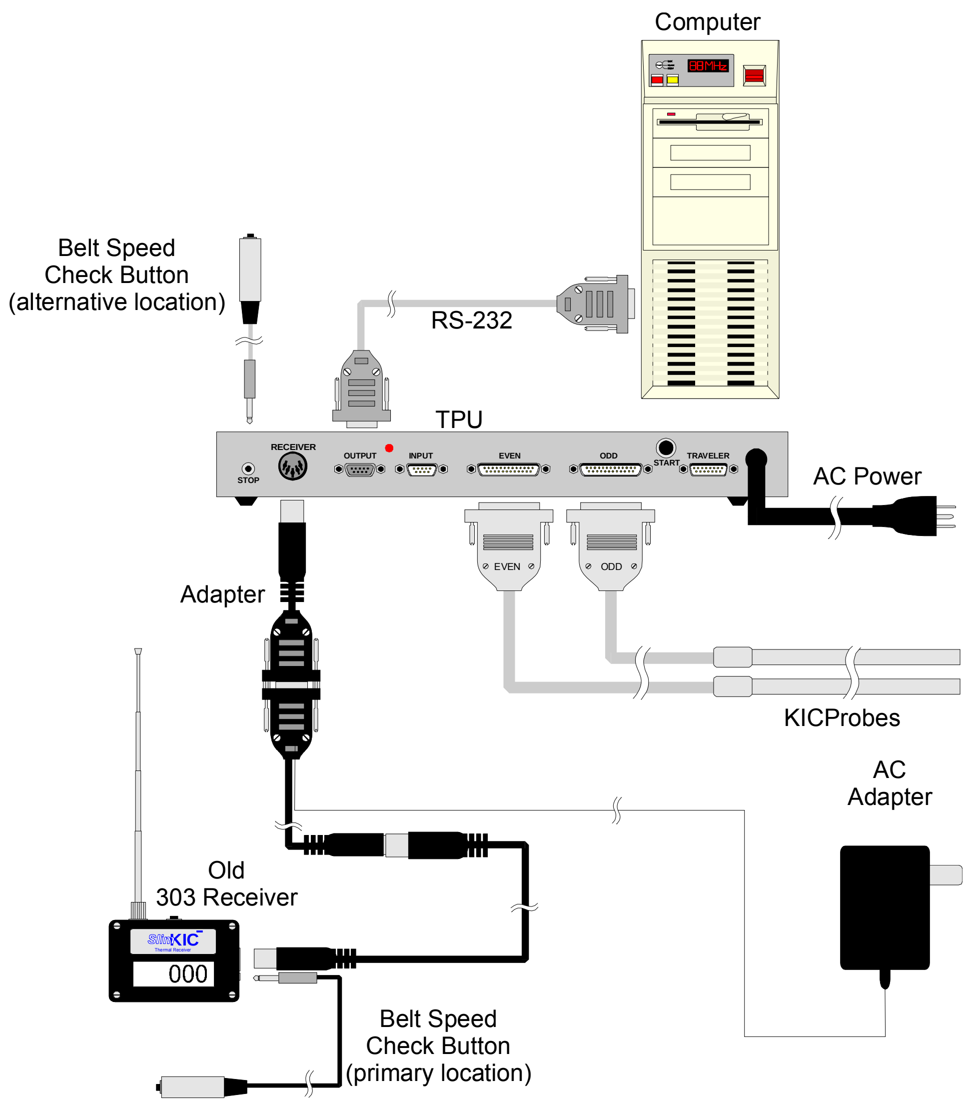
The Thermal Receiver is connected to the AC adapter cable (provided with SideKIC and SlimKIC Thermal Profilers). This AC adapter cable is attached to the special power adapter, then connected to the TPU. The AC adapter is plugged into an electrical outlet.

The KICprobes are attached to the front panel of the TPU.

The Belt Speed check button can be connected either directly to the Thermal Receiver, or directly to the TPU.

Either the Start button on the top of the Thermal Receiver or the Start button on the face of the TPU can be used to start a profile.

Note: This is in addition to the F2 key of the computer keyboard and the Start Profile icon on the KIC software toolbar.



Setup: TPU with a 303 (new) Receiver

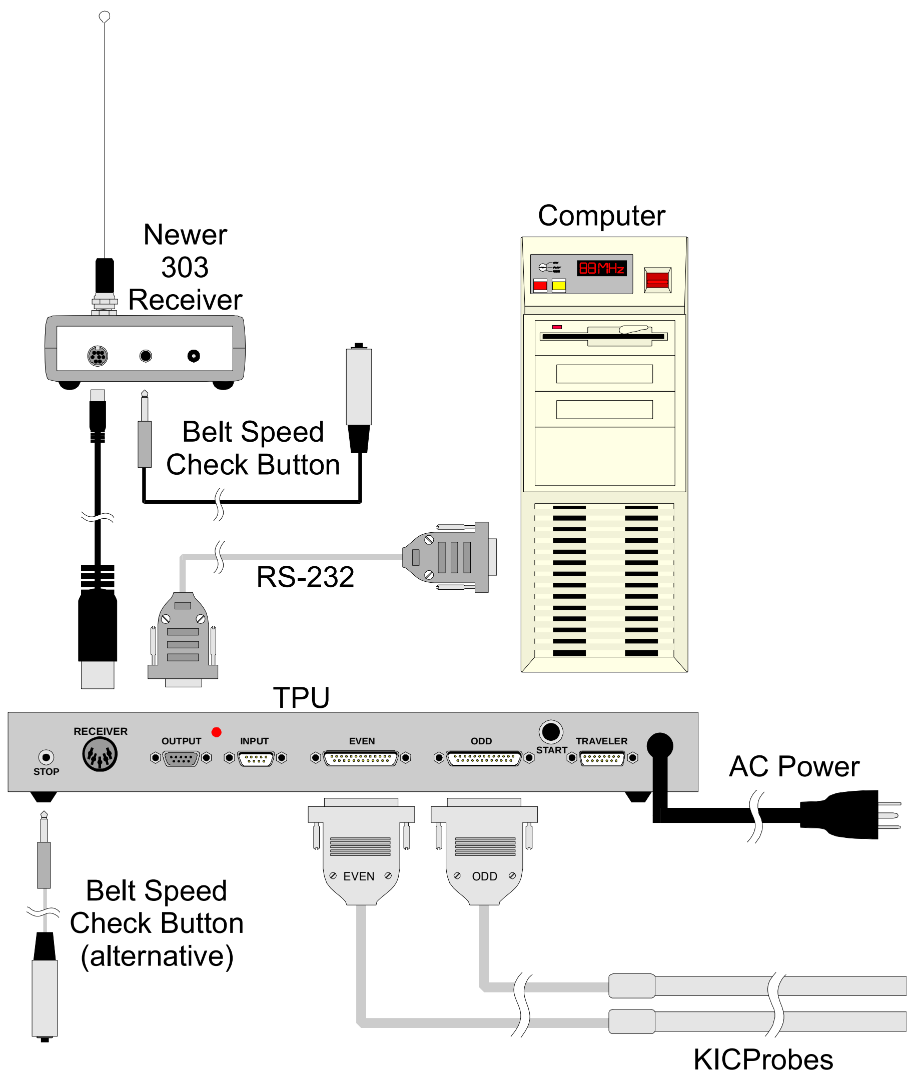
The Thermal Receiver is connected directly to the TPU. The TPU is attached to the computer using a RS-232 connection.

The KICprobes are attached to the front panel of the TPU.

The Belt Speed check button can be connected either directly to the Thermal Receiver, or directly to the TPU.

Either the Start button on the face of the Thermal Receiver or the Start button on the face of the TPU can be used to start a profile.

Note: This is in addition to the F2 key of the computer keyboard and the Start Profile icon on the KIC software toolbar.



Setup: TPU with a 433MHz Receiver

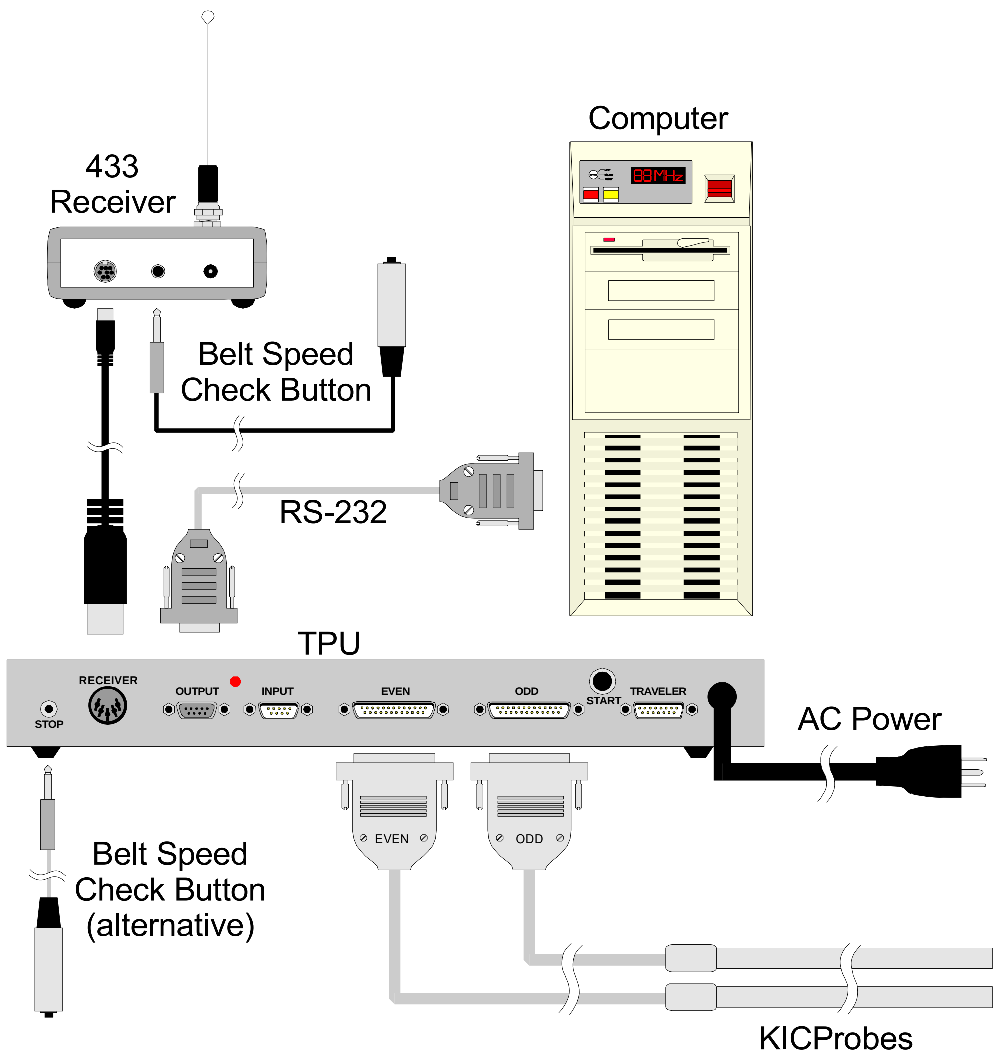
The Thermal Receiver is connected directly to the TPU. The TPU is attached to the computer using a RS-232 connection.

The KICprobes are attached to the front panel of the TPU.

The Belt Speed check button can be connected either directly to the Thermal Receiver, or directly to the TPU.

Either the Start button on the face of the Thermal Receiver or the Start button on the face of the TPU can be used to start a profile.

Note: This is in addition to the F2 key of the computer keyboard and the Start Profile icon on the KIC software toolbar.



Setup: TPU with Thermocouple Extension

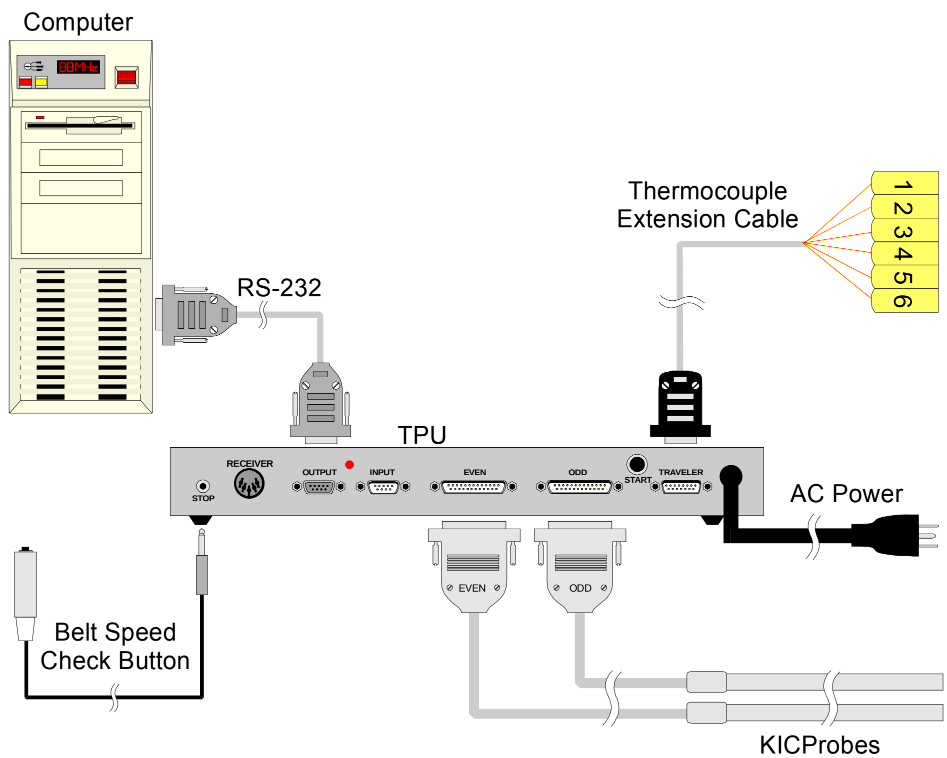
The Thermocouple Extension cable is connected Traveler port of the TPU. The TPU is attached to the computer using either a KIC-Link or a RS-232 connection.

The KICprobes are attached to the front panel of the TPU.

The Belt Speed check button is connected to the Stop port of the TPU.

The Start button on the face of the TPU is used to start a profile.

Note: This is in addition to the F2 key of the computer keyboard and the Start Profile icon on the KIC software toolbar.



Setup: TPU with Barcode Reader Option

The implementation of a barcode reader with a KIC system will require the use of a dedicated COM port for the reader.

Note: The BARCODE.DLL must be assigned within the KIC software's Hardware Input Monitor to the COM port that the barcode reader is attached to.

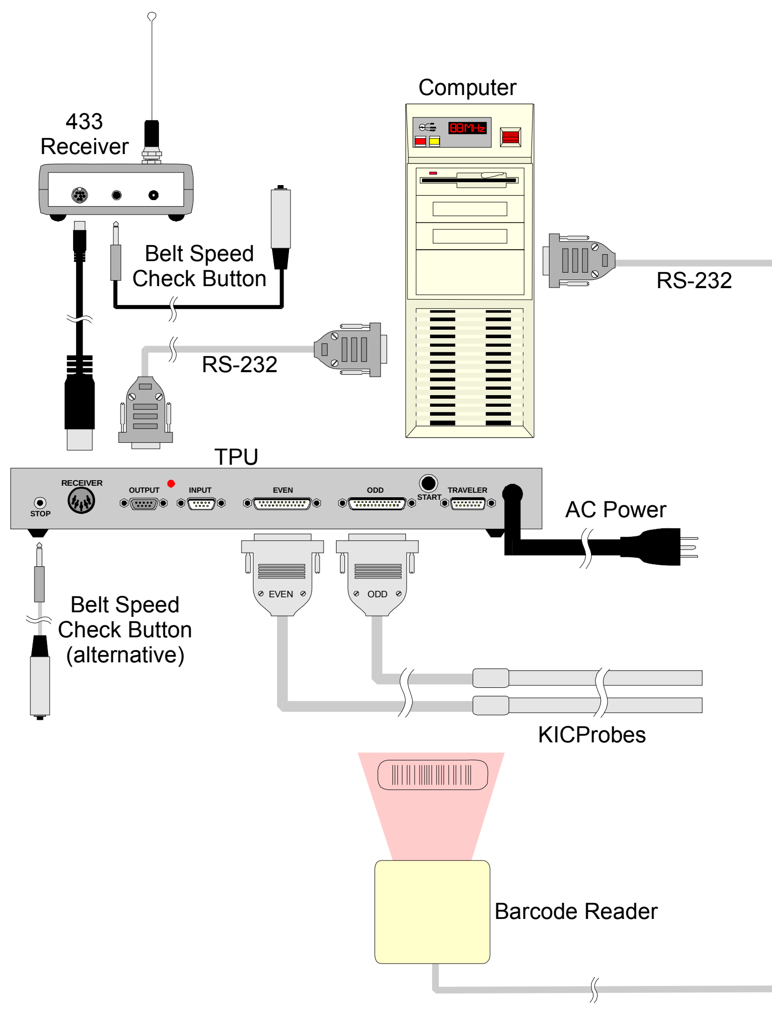
The Thermal Receiver is connected directly to the TPU. The TPU is attached to the computer using a KIC-Link network or RS-232 connection.

The KICprobes are attached to the front panel of the TPU.

The Belt Speed check button can be connected either directly to the Thermal Receiver, or directly to the TPU.

Either the Start button on the face of the Thermal Receiver or the Start button on the face of the TPU can be used to start a profile.

Note: This is in addition to the F2 key of the computer keyboard and the Start Profile icon on the KIC software toolbar.



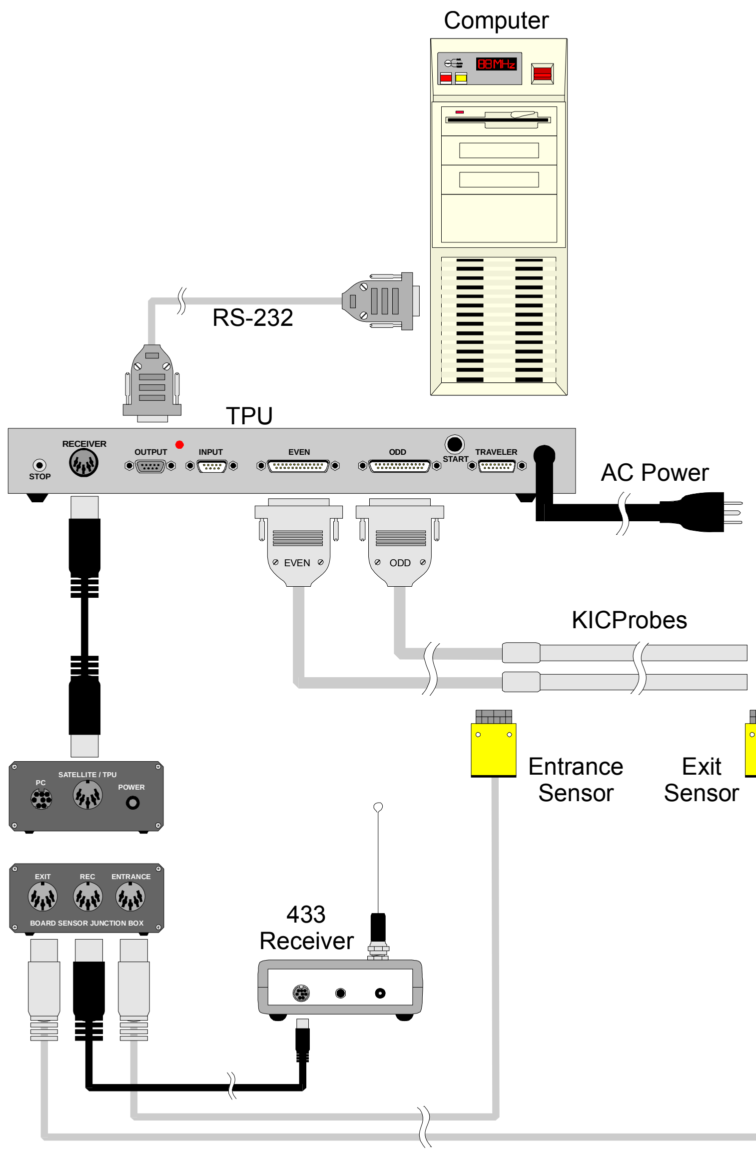
Setup: TPU with Board Sensor Option

The Thermal Receiver and the Board Sensors are connected directly to the Board Sensor Junction Box. The Board Sensor Junction Box is attached to the TPU Receiver port.

The TPU is attached to the computer using a KIC-Link network or RS-232 connection. The KICprobes are attached to the front panel of the TPU.

The F2 key of the computer keyboard or the Start Profile icon on the KIC software toolbar is used to "arm" the profile start. The profile is started when the board passes underneath the Board Sensor located at the oven tunnel's entrance.

Note: The Start and Belt Speed check switches on the Thermal Receiver are not used as these functions are served by the Board Sensor system.



Setup: KICboards with Board Sensor Option

The Thermal Receiver and the Board Sensors are connected directly to the Board Sensor Junction Box. The Board Sensor Junction Box is attached to the computer COM port.

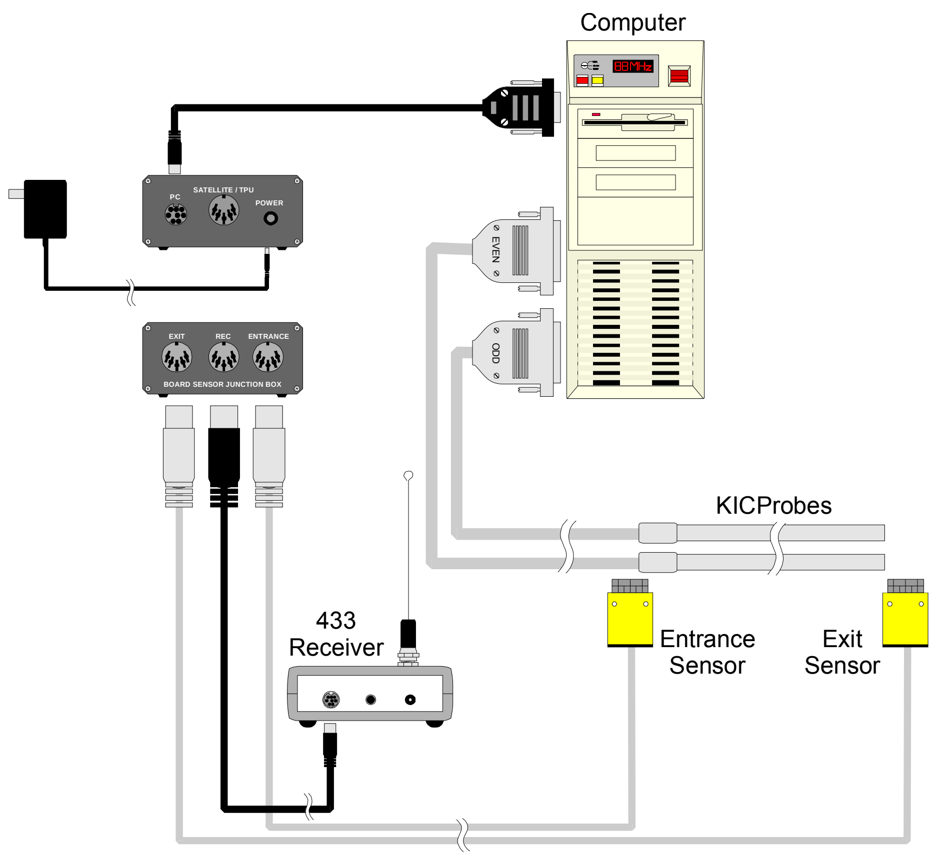
Note: The KICIO.DLL must be assigned within the KIC software's Hardware Input Monitor to the COM port that the Board Sensor Junction Box is attached to.

The Board Sensor Junction Box is externally powered by the AC adapter.

The KICprobes are attached to the KICboard cards installed inside the computer.

The F2 key of the computer keyboard or the Start Profile icon on the KIC software toolbar is used to "arm" the profile start. The profile is started when the board passes underneath the Board Sensor located at the oven tunnel's entrance.

Note: The Start and Belt Speed check switches on the Thermal Receiver are not used as these functions are served by the Board Sensor system.



Setup: KICboards with any Thermal Receiver

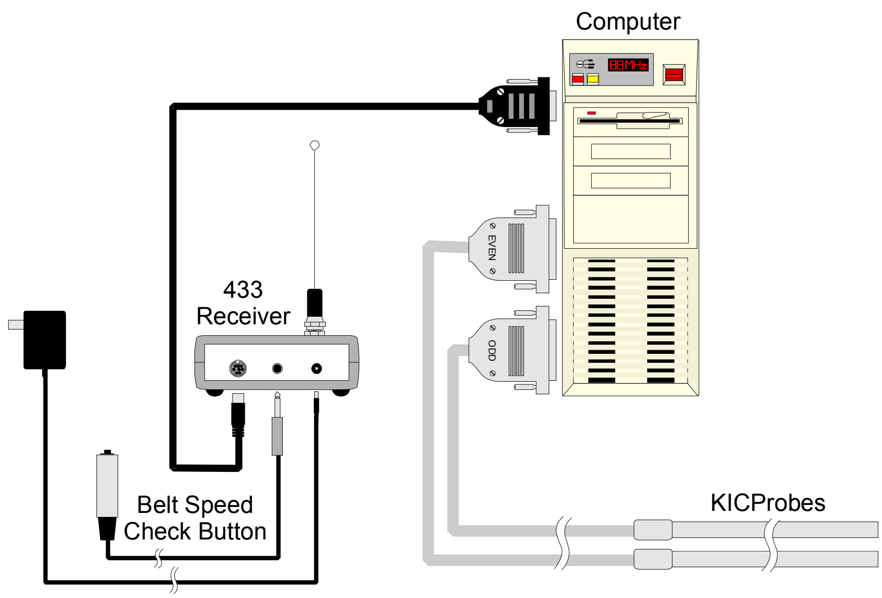
The Thermal Receiver is attached to the computer COM port and is externally powered by the AC adapter (433 Thermal Receiver setup shown).

The KICprobes are attached to the KICboard cards installed inside the computer.

The Belt Speed check button is connected directly to the Thermal Receiver.

The Start button on the face of the Thermal Receiver is used to start a profile.

Note: This is in addition to the F2 key of the computer keyboard and the Start Profile icon on the KIC software toolbar.



Setup: TPU with KIC Alarm Relay Option (RS-232)

The Thermal Receiver is connected directly to the TPU. The TPU is attached to the computer using a RS-232 connection. The KICprobes are attached to the front panel of the TPU.

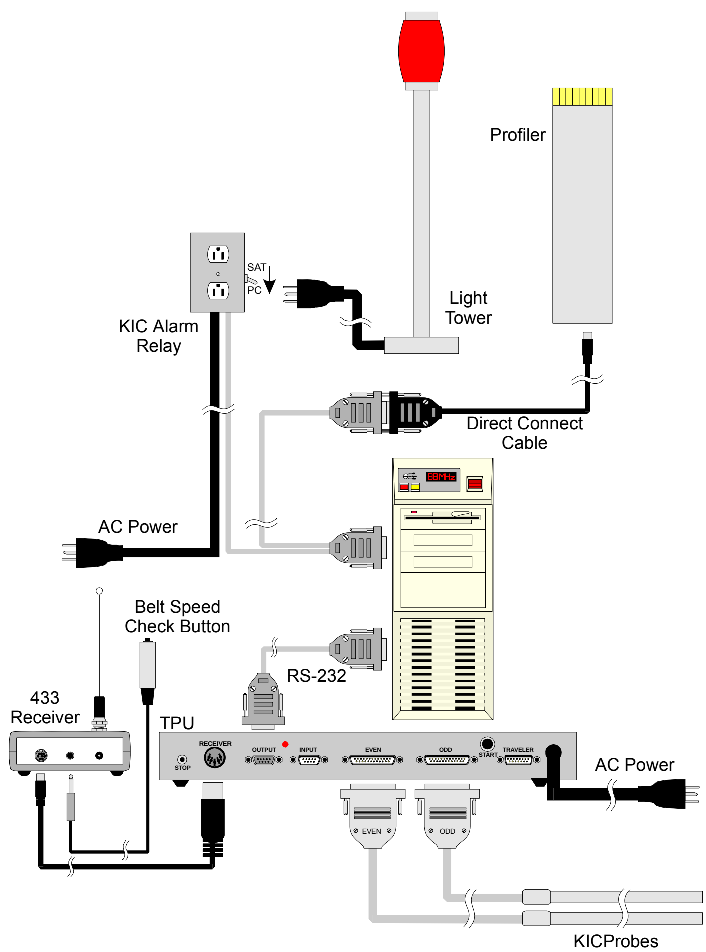
The Belt Speed check button can be connected either directly to the Thermal Receiver, or directly to the TPU. Either the Start button on the face of the Thermal Receiver or the Start button on the face of the TPU can be used to start a profile.

Note: This is in addition to the F2 key of the computer keyboard and the Start Profile icon on the KIC software toolbar.

The KIC Alarm Relay is connected to another computer COM port. It's AC power cable is connected to an electrical outlet and provides controlling power to alarm devices (light tower in this example) attached to the relay.

The extra connector can be used as an extension of the computer COM port for the purposes of "sharing" the port for such things as downloading data logged onto the SlimKIC Thermal Profiler.

Note: The KICIO.DLL must be assigned within the KIC software's Hardware Input Monitor to the COM port that the KIC Alarm Relay is attached to.

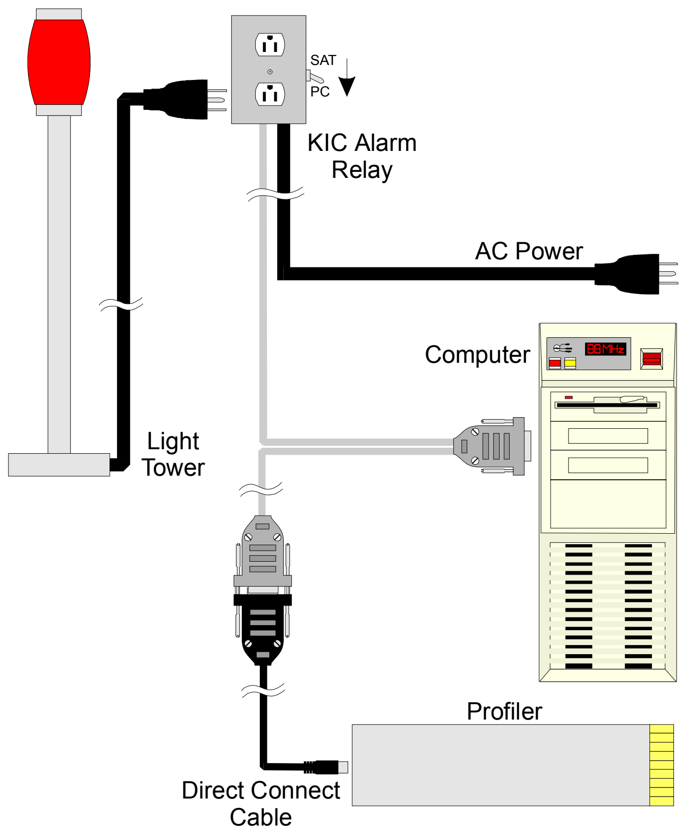


Setup: KIC Alarm Relay and SlimKIC

The KIC Alarm Relay is connected to another computer COM port. It's AC power cable is connected to an electrical outlet and provides controlling power to alarm devices (light tower in this example) attached to the relay.

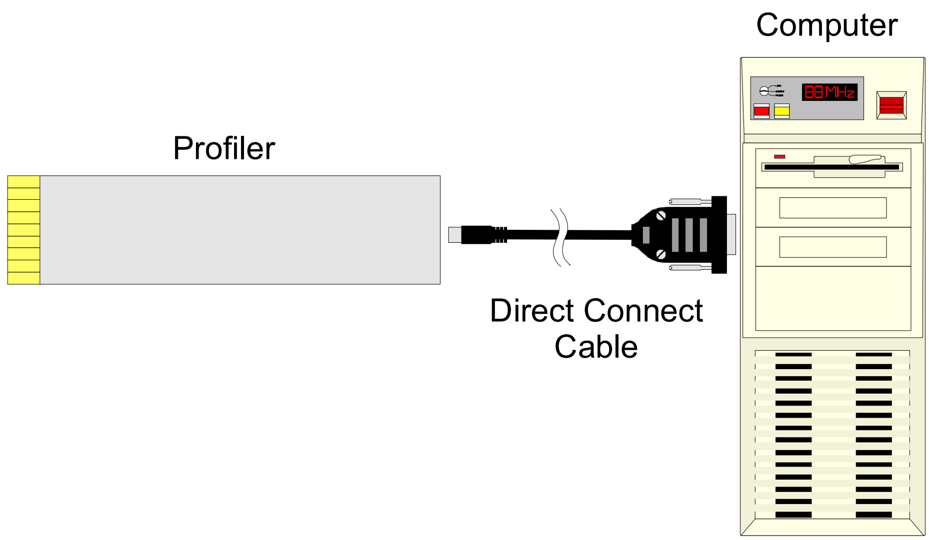
The extra connector can be used as an extension of the computer COM port for the purposes of "sharing" the port for such things as downloading data logged onto the SlimKIC Thermal Profiler.

Note: The KICIO.DLL must be assigned within the KIC software's Hardware Input Monitor to the COM port that the KIC Alarm Relay is attached to.



Setup: SlimKIC Direct Connect

The SlimKIC Thermal Profiler is connected to a computer COM port using the Direct Connect cable for the purpose of setting up the SlimKIC, downloading logged data, or collecting data in real-time.

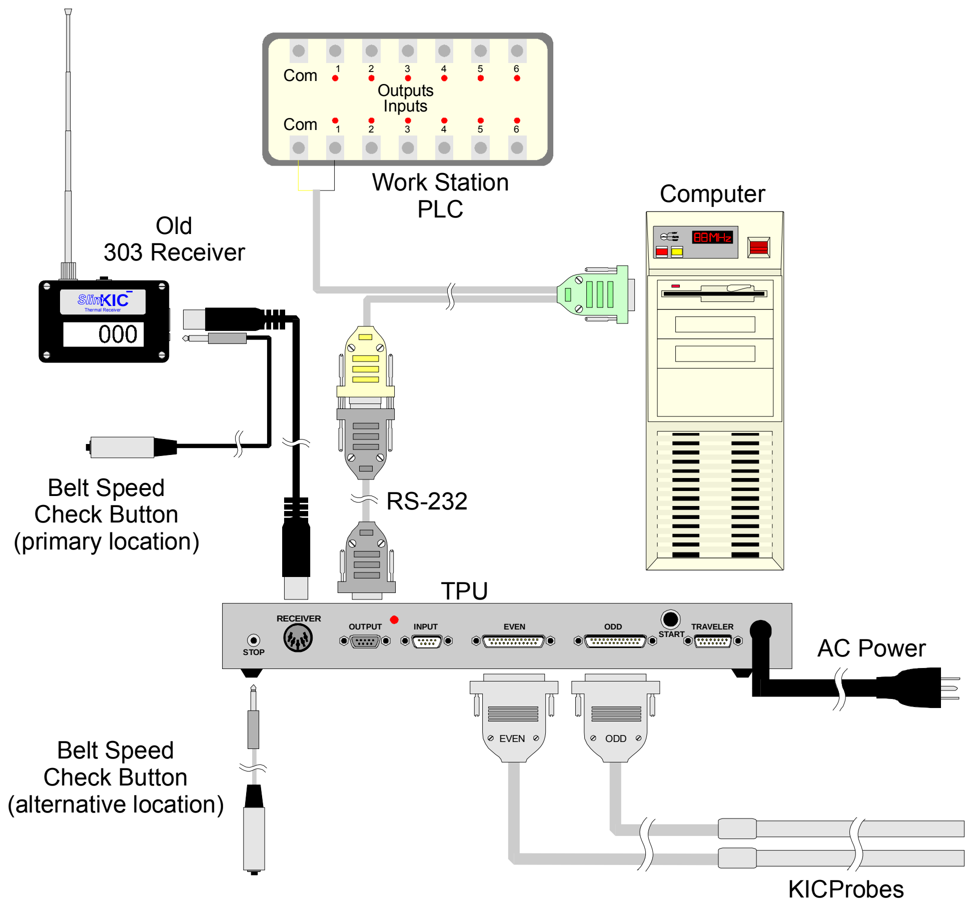


Setup: TPU with PLC Cable

This is a special cable that interfaces the computer, the TPU and a Programmable Logic Controller.

The green connector is attached to the computer COM port, the yellow connector is attached to the TPU, or RS-232 cable coming from the TPU.

The open ended cable routes to the PLC. The output of this cable will either be 0 or +12VDC. How this Alarm output to the PLC is handled within the PLC logic is completely defined by the user.



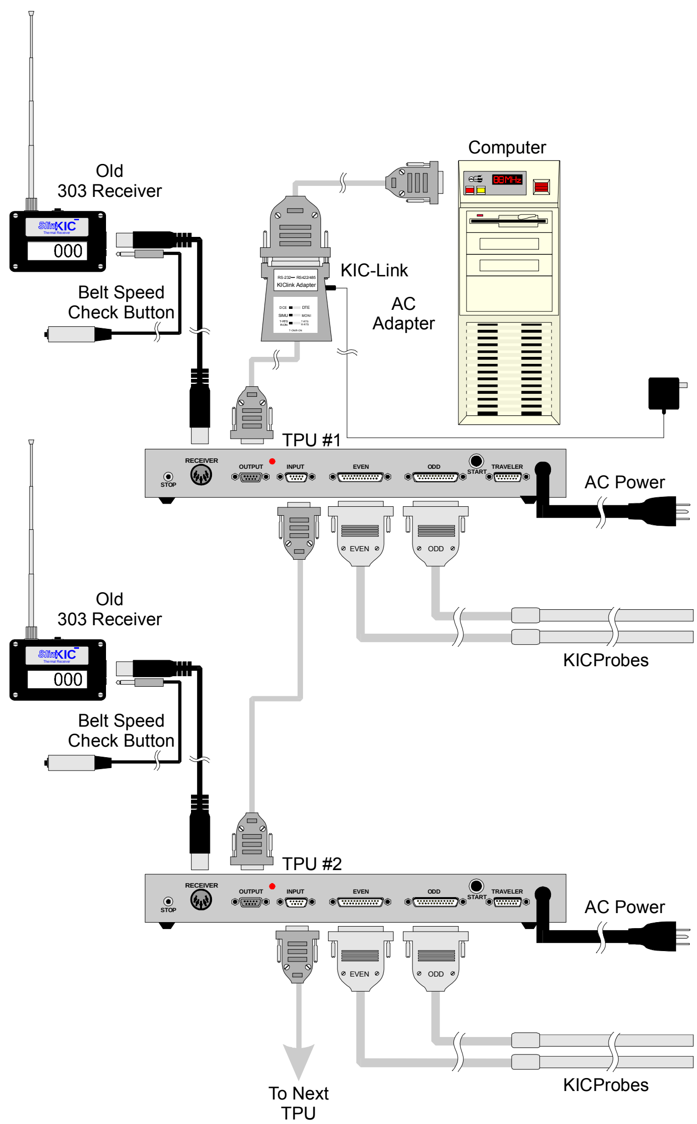
Setup: KIC-Link with 303MHz (older) Receiver

The Thermal Receivers are connected directly to the TPUs. The TPUs are networked together with KIC-Link cabling. Up to 9 TPUs can be connected in this fashion. The first computer is attached to the KIC-Link Adapter, which is connected to the computer COM port.

The KICprobes are attached to the front panels of the TPUs.

The Belt Speed check buttons can be connected either directly to the Thermal Receivers, or directly to the TPUs. Either the Start button on the tops of the Thermal Receivers or the Start buttons on the faces of the TPUs can be used to start a profile.

Note: This is in addition to the F2 key of the computer keyboard and the Start Profile icon on the KIC software toolbar.



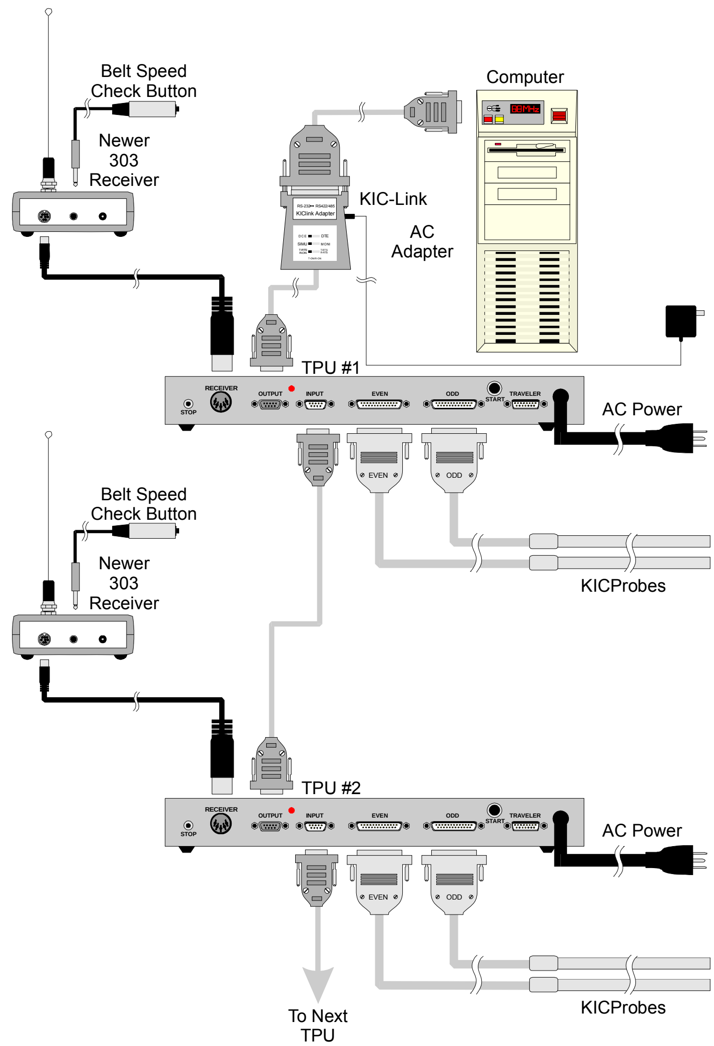
Setup: KIC-Link with 303MHz (newer) Receiver

The Thermal Receivers are connected directly to the TPUs. The TPUs are networked together with KIC-Link cabling. Up to 9 TPUs can be connected in this fashion. The first computer is attached to the KIC-Link Adapter, which is connected to the computer COM port.

The KICprobes are attached to the front panels of the TPUs.

The Belt Speed check buttons can be connected either directly to the Thermal Receivers, or directly to the TPUs. Either the Start button on the faces of the Thermal Receivers or the Start buttons on the faces of the TPUs can be used to start a profile.

Note: This is in addition to the F2 key of the computer keyboard and the Start Profile icon on the KIC software toolbar.



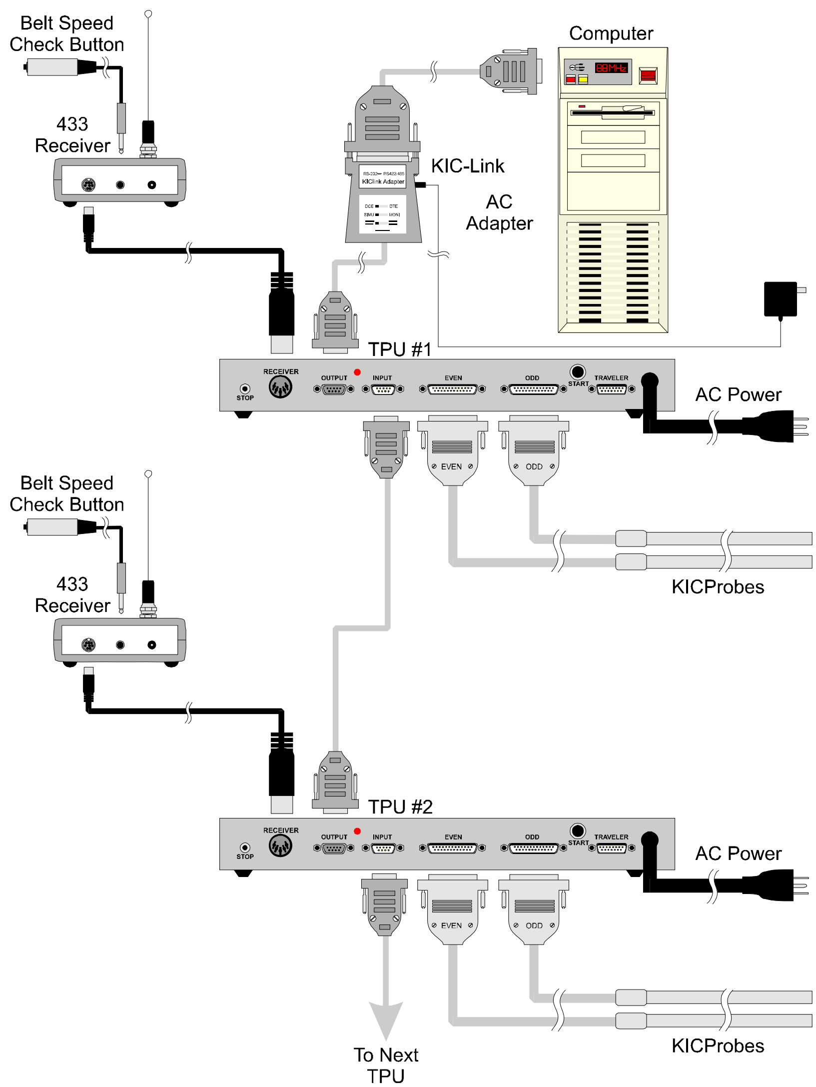
Setup: KIC-Link with 433MHz Receiver

The Thermal Receivers are connected directly to the TPUs. The TPUs are networked together with KIC-Link cabling. Up to 9 TPUs can be connected in this fashion. The first computer is attached to the KIC-Link Adapter, which is connected to the computer COM port.

The KICprobes are attached to the front panels of the TPUs.

The Belt Speed check buttons can be connected either directly to the Thermal Receivers, or directly to the TPUs. Either the Start button on the faces of the Thermal Receivers or the Start buttons on the faces of the TPUs can be used to start a profile.

Note: This is in addition to the F2 key of the computer keyboard and the Start Profile icon on the KIC software toolbar.



Setup: KIC-Link with KIC Alarm Relays

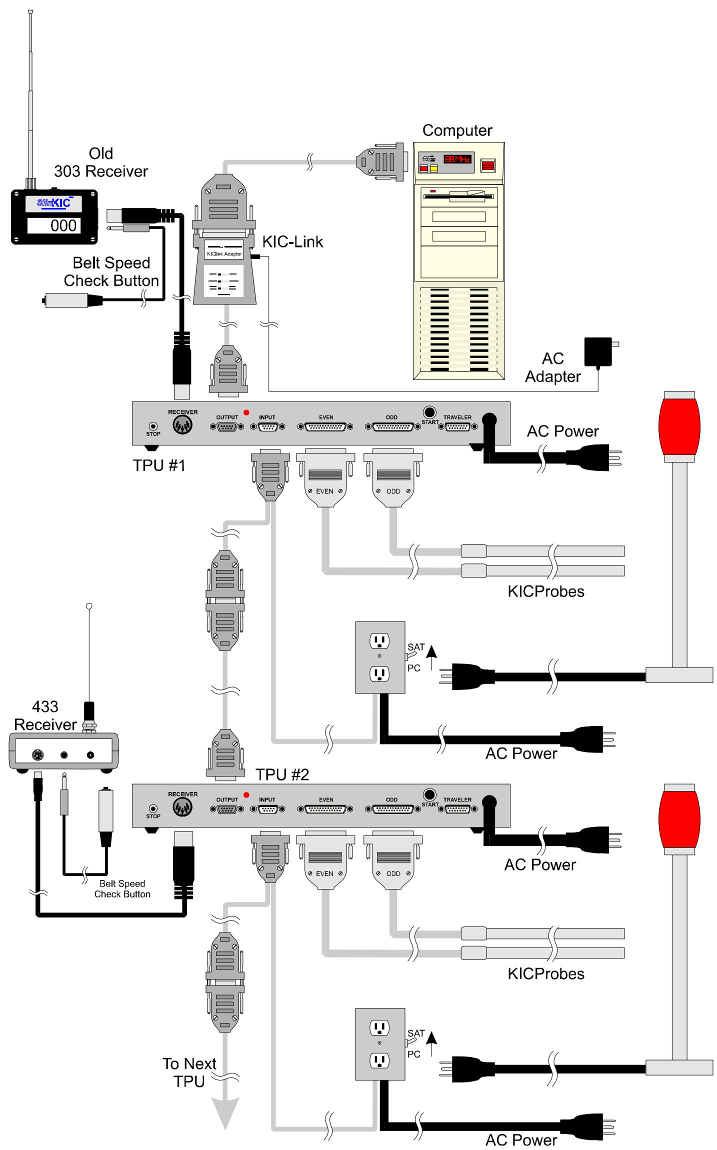
The Thermal Receivers are connected directly to the TPUs. The TPUs are networked together with KIC-Link cabling via the KIC Alarm relay cables. Up to 9 TPUs and KIC Alarm Relays can be connected in this fashion.

Note: Mixing and matching of Thermal Receivers in the KIC-Link network is allowed.

The first computer is attached to the KIC-Link Adapter, which is connected to the computer COM port. The KICprobes are attached to the front panels of the TPUs.

The Belt Speed check buttons can be connected either directly to the Thermal Receivers, or directly to the TPUs. Either the Start button on the faces of the Thermal Receivers or the Start buttons on the faces of the TPUs can be used to start a profile.

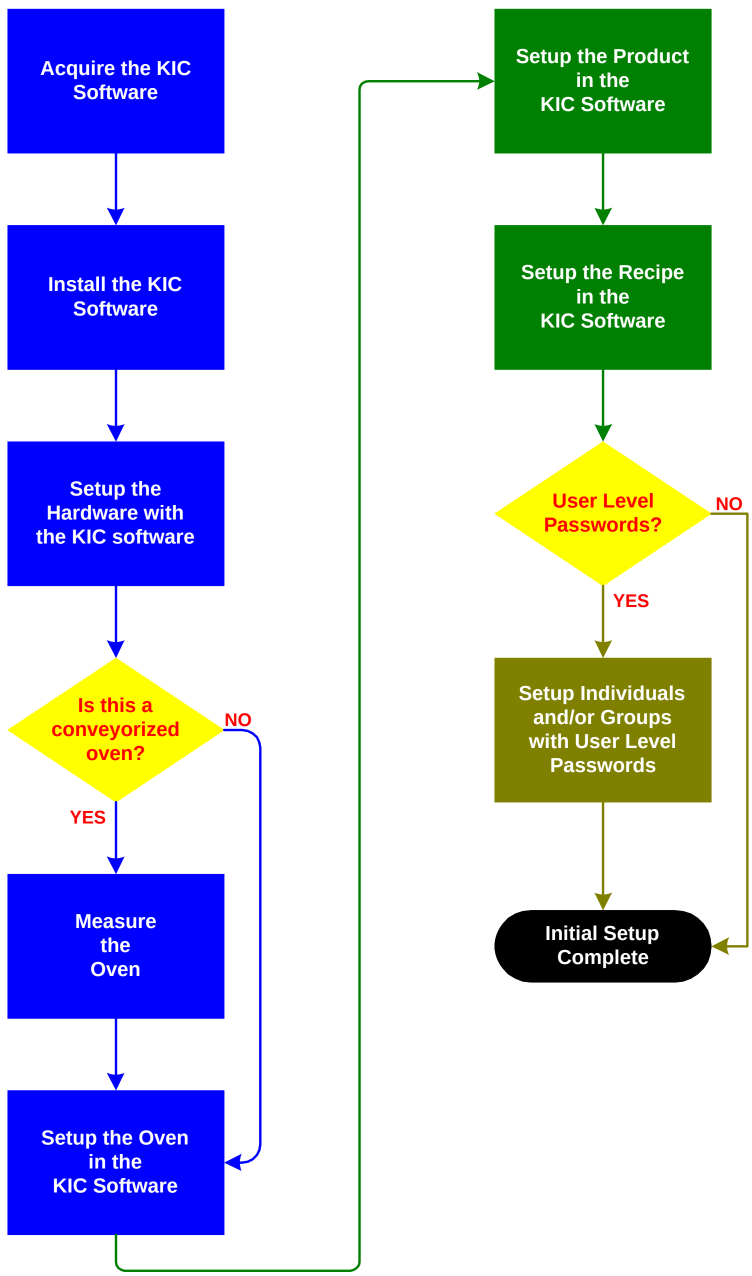
Note: This is in addition to the F2 key of the computer keyboard and the Start Profile icon on the KIC software toolbar.



SYSTEM SETUP

This section covers setting up the software on the system and includes everything from how to acquire the KIC software, to installing and setting it up. The flowchart below outlines the items covered. The order of sequence should be maintained.

Items in **blue** indicate steps that are generally only performed once per setup. Items in **green** and **gold** indicate steps that are generally repeated in addition to the initial setup.



Acquiring the KIC software

As newer KIC software becomes available, it is routinely posted on our internet web site, free for downloading.

Note: We use our web site as a means of distributing our latest software releases in the most expeditious manner possible for the customer, and as a means of reducing our overhead required to package and ship the software.

The KIC software can be acquired through the following methods:

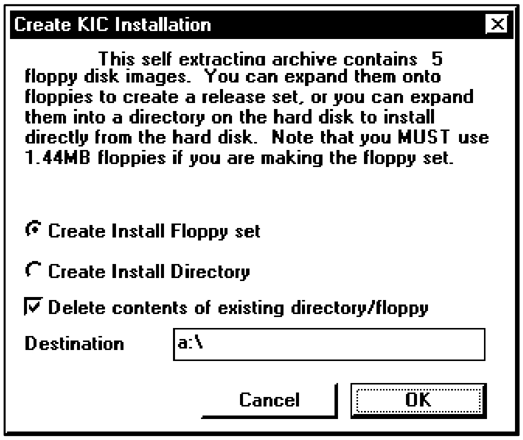
- Accessing the KIC Thermal Profiling WEB site at http://www.kicthermal.com
- Accessing the KIC Thermal Profiling FTP site at ftp://www.kicthermal.com
- Contacting KIC Sales at (619) 673-6050 and requesting a copy. A nominal shipping and handling charge may apply.

Receiving the KIC software via our WEB or FTP site will entail downloading a single file that is typically larger than 7Mb. You must ensure that the downloaded file is NOT pointing to a floppy drive device when receiving as most web browsers will not warn you that the file is too large prior to the start of the download. You must save the file to a drive with the appropriate available memory capacity.

Note: Some businesses have "firewalls" setup on their networks that prevent the downloading of files from a web site. If this is your case, you should contact your Network Administrator to discuss you options for downloading the KIC software.

Once the software is downloaded, you're ready to "create" a set of installable floppy diskettes or a hard drive subdirectory from which the install can be performed. To do this, simply go to the directory where the download was save to and double-click on file icon.

The KICDIST dialog box will appear and automatically examine the files within the download, then the **Create KIC Installation** dialog box below will appear.



From the **Create KIC Installation** dialog box you have two options:

- **Create a set of installation floppy diskettes** – This is the most versatile installation method. The floppies can be easily transported to other KIC installations throughout your facility.
- **Create an installation subdirectory on the local or network hard drive** – This is the fastest installation method.

Note: Creating the installation directory on the network hard drive has the added advantage of allowing the KIC software installation to be performed from any client on the network.

If the Windows/System subdirectory for your computer (client) is located on the network server's hard drive and this directory has been write protected by your System Administrator, you will not be able to successfully install the KIC software by any means until your System Administrator grants temporary write access to these directories.

You can always run through this routine again at a later date and choose an alternative installation method as long as the original downloaded file is available.

CREATING A SET OF INSTALLATION FLOPPIES

To create a set of installation disks, simply following the instructions in the **Create KIC Installation** dialog box. If you would like each diskette to be formatted prior to creating the installations files, ensure you select the **Delete Contents of Existing Directory/Floppy** checkbox prior to starting.

As the information on each diskette is written, it will also be verified. You will be prompted when to input another disk.

CREATING A HARD DRIVE INSTALLATION DIRECTORY

To create an installation directory on a local or network hard drive, simply following the instructions in the **Create KIC Installation** dialog box. The default drive and name will be c:\wkinst.

Note: This is NOT the actual KIC software installation – only the expansion of the files from the single file that was downloaded. Once the KIC software installation procedure has been successfully completed, this installation directory may be deleted at your discretion.

ABOUT VIRUS PROTECTION

Whichever method you choose to receive the newest software from KIC Thermal Profiling, you should be aware that the files and floppies you receive have been thoroughly scanned for computer viruses by KIC. *It is highly unlikely that a virus will propagate itself onto your computer system through the KIC software.*

However, because floppy diskettes cannot be 100% protected from virus infections once used on your computer (i.e., an unknown virus writes itself from your hard drive to the installation floppies) and good rule of thumb is to always leave the write protection tabs on the floppies "open" once created or received.

Additionally, it's good practice to scan the hard drive and computer memory for viruses *BEFORE* creating a set of installation diskettes. If a virus is present, it may write itself to the diskettes during the process of creating a set of installation floppies.

For more information about virus protect, please consult with your company's Information Systems Manager.

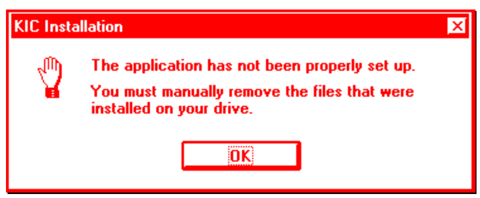
Installing the Software

Prior to the installation of the KIC software, you should shutdown all other applications that are currently running on the computer as a precaution against software conflicts. This is a sound practice to use whenever you install <u>any</u> software package.

Note: You <u>cannot</u> run the KIC software from a client where the software has only been installed on a network server. Simply placing a shortcut icon on the client desktop that points the KIC software installation on a server <u>will not work</u>. Although the KIC software facilitates the ability of writing oven temperature data to files to the network server's hard drive, you cannot run the software from the server.

If, when starting the installation program, a dialog box is displayed that indicates that there may be a problem, choose ABORT.

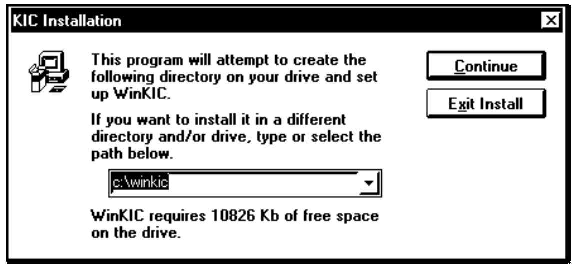
If, at any time, a dialog box displays informing you that the software installation was not successful, rest assured, the KIC software has <u>not</u> been installed correctly and attempting to use the KIC software may cause serious side effects.



If you're having trouble getting the software to install correctly, please take the time to contact KIC Technical Support for assistance.

To install the KIC software, perform the following steps:

- If installing from disks, insert the first disk into drive A, then start the SETUP.EXE program. If installing from the hard drive start the SETUP.EXE program located in the temporary installation subdirectory that you created earlier.
- The readme.txt file will appear. Please take some time to read this very important information. When you are finished, click the **Continue** button. The **KIC Installation** dialog box will appear.



- Although you can choose to install the KIC software onto any local or network hard drive and subdirectory you wish, we highly recommend you use the default C:\winkic. Click on the Continue button.

  If the Windows/System subdirectory for the client computer is located on the network server and it's been write protected by the System Administrator (which is typical), you will have to talk to your System Administrator about granting temporary write access to these directories before *performing an installation.*

- Simply follow the instructions of each dialog box throughout the remainder of the installation.
- **After the installation has successfully completed, you should reboot your computer.**

Installing the Software Key

If you have purchased additional options that require the presence of the Software Key to implement and use, you cannot use these features until the Software Key has been properly attached to a printer port on the computer.

Version 2.2 of the KIC software will actively seek-out the attachment of a Software Key on every parallel port found on your computer during startup.

If the Software Key is found, it then interrogates the information encoded on the Software Key to determine which optional features are enabled. The KIC software then enables the use of these optional features, and displays the Software Key information on the initial splash screen during startup.

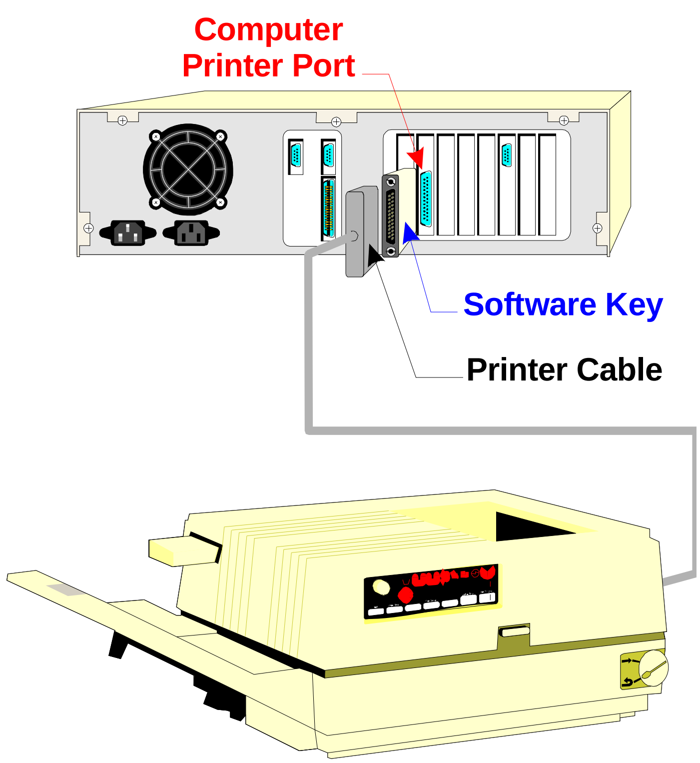
The KIC software will further check for the presence of this Software Key during the use of the software, intermittently.

Removal of the Software Key during the KIC software's operations will cause the optional features to become disabled the next time the KIC software checks for it's presence.

Removal of the Software Key with the computer powered may cause irreparable damage to the Software Key and possibly to the computer as well.

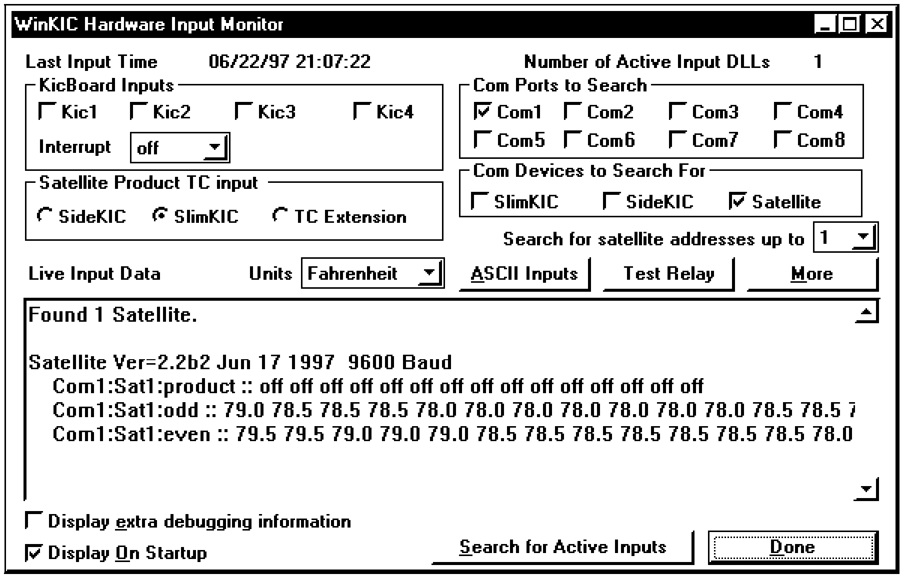
To install the Software Key, follow these steps:

- Remove power from the computer and the printer.
- Remove the printer cable currently connected to the parallel port.
- Firmly attach the male end of the Software Key to the computer parallel port and hand-tighten the thumb-screws.
- Firmly attach the printer cable to the female end of the Software Key and hand-tighten the thumb screws.
- Apply power to the computer and the printer.
- Functionally check the Software Key's operation. If the Software Key is properly working, the optional features will appear in the KIC software's splash screen during startup.



Setting Up the KIC Hardware

The Hardware Input Monitor is the means by which the user inputs which KIC devices are connected to which computer COM ports. The Hardware Input Monitor can display up to 8 separate COM ports.



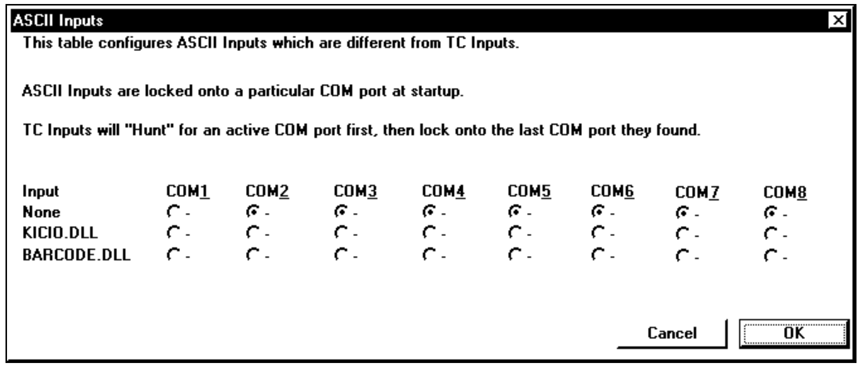
SETUP

- In **COM Ports to Search**, select the COM port the TPU is connected to.
- In **COM Devices to Search for:**
  - ✓ Select **SlimKIC** if a SlimKIC or SlimKIC-II Thermal Profiler is connected to the COM port via a Direct Connect cable or via a Thermal Receiver.
  - ✓ Select **SideKIC** if a SideKIC Thermal Profiler is connected to the COM port via a Thermal Receiver.
  - ✓ Select **Satellite** if a TPU is being used. (typical setup)

    If this a KIC-Link network, in **Search for Satellite Addresses Up to**, select the number of TPUs on this network. Up to 9 TPUs can be selected

    In **Satellite Product TC Input**, select which type of device you will be using to collect temperature profile data through the TPU – **SideKIC**, **SlimKIC**, or **TC Extension**. The devices selected here indicate which type of devices from the TPU the temperature profile data will come from.
- If you are using KICboards:
  - ✓ Select the number of checkboxes corresponding to the number of KICboards installed in the **KICboard Inputs** box.
  - ✓ Select which **Interrupt** number is selected for the KICboards.
- If barcode readers will be used, or if a KIC Alarm Relay or Board Sensor system will be used, but will not share the same COM port as the TPU, then click on the **ASCII Inputs** button. The **ASCII Inputs** dialog box will appear.
  - ✓ For the KIC Alarm Relay or Board Sensor system – select which COM port that the system will occupy for KICIO.DLL.

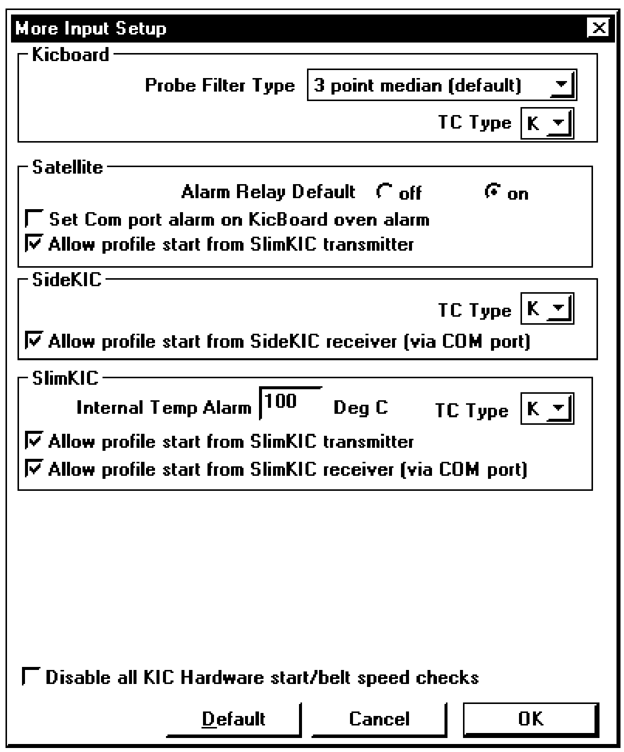
- ✓ For the barcode reader – select which COM port the reader will occupy for the BARCODE.DLL.



MORE INPUT SETUP

To provide more control over how the devices setup on the Hardware Input Monitor will work, click on the **More** button. The **More Input Setup** dialog box will appear.

*Note: Which devices appear on the **More Input Setup** dialog box depend upon which device(s) you have selected in the Hardware Input Monitor. For the purpose of brevity, the dialog box below shows all devices and their defaults.*



- **KICboard**
  - ✓ **Probe Filter Type** – select which type of data filter to use. The default is 3 Point Median.
  - ✓ **TC Type** – select which type of thermocouple to use. The default is Type-K.
- **Satellite (TPU)**

  - ✓ **Alarm Relay Default** – select what the default state of the optional KIC Alarm Relay or PLC cable state. The default is ON.
  - ✓ **Set COM Port Alarm On KIC Oven Alarm** – select this checkbox to allow an alarm condition on an oven attached through KICboards to enable a KIC Alarm Relay on a COM port to activate. The default is OFF.
  - ✓ **Allow Profile Start from SlimKIC Transmitter** – select this checkbox if you wish to be able to initiate a profile start from the SlimKIC Thermal Profiler start/stop switch. The default is ON.
- **SideKIC**
  - ✓ **TC Type** – select which type of thermocouple to use. The default is Type-K.
  - ✓ **Allow Profile Start from SideKIC Receiver (via COM port)** – select this checkbox if you want to be able to initiate a profile start from the Thermal Receiver. The default is ON.
- **SlimKIC**
  - ✓ **Internal Temp Alarm** – This is the setting that will cause the KIC software to display an over-temperature alarm when this value is reached, and an over-temperature warning about 20ºC below this value. The default is 100ºC is should normally never be changed.
  - ✓ **TC Type** – select which type of thermocouple to use. The default is Type-K.
  - ✓ **Allow Profile Start from the SlimKIC Transmitter** – select this checkbox if you wish to be able to initiate a profile start from the SlimKIC Thermal Profiler start/stop switch. The default is ON.
  - ✓ **Allow Profile Start from SlimKIC Receiver (via COM port)** – select this checkbox if you want to be able to initiate a profile start from the Thermal Receiver. The default is ON.
- **Disable all KIC Hardware Start/Belt Speed Checks** – select this checkbox to have the KIC software ignore any attempt to start a profile or perform a belt speed check from any of the KIC hardware. The default is OFF.

Measuring a Conveyorized Oven

The Prophet Thermal Manager sets itself apart from standard temperature measurement systems by employing the ability to monitor in-process temperature deviations from a known starting point, or baseline.

The Prophet Thermal Manager cannot accomplish this goal without first considering such things as the oven's geometry.

Perform the following steps:

- Setup your tape measure by laying it out along the oven's length, placing the start of the tape at the ovens tunnel entrance. The tunnel entrance is that point at which the product disappears into the oven.

  All of the measurements taken from here on will use the tunnel entrance as the reference point. For convenience, an Oven Measurement Sheet has been included on the next page. Additionally, Oven Measurement Diagrams have also been included on the following pages for orientation.

  Note: Avoid movement of the tape measure once in place.
- Determine the **Oven Type** (i.e., solder reflow, wave solder, etc.).
- Determine the **Oven Heat Source** (i.e., IR, Convection, etc.).
- Determine the **KICprobe part number** that will be used in this installation.
- Determine the **Unit of Measure** you will be using throughout this procedure.
- Determine whether the top & bottom of each zone will be set to different temperatures.
- Measure the Tunnel Length of the oven.
- Measure the **KIC Oven Start Position From the Tunnel** (KICStart). These two are generally the same point (i.e., a value of zero).
- Measure the **KIC Oven End Position From the Tunnel Exit** (KICEnd). This value is usually 0 (zero) unless there are cooling fans mounted on the oven's off-load table.
- Measure the **Distance from the Tunnel Entrance to the Start of the Zone** 1 (Z1).

  Note: Some ovens have "gaps" between the zones that are equally divided between the two adjacent zones.
- Measure the **Distance from the Tunnel Entrance to the Tip of the Zone Control Thermocouple** (Z1TC).

  Note: If the tip of the oven's control TC is located in the center of the zone, simply write the letter "C". If you have two zones with a gap between them, the control TCs in these two zones will not be centered once the gap is considered.
- Repeat these steps for the remaining zones.
- Measure the Distance from the Tunnel Entrance to the End of the Last Zone (Zend).

  Note: This is the end of the last zone, not necessarily the end of the oven's tunnel.

Oven Measurement Sheet

Oven Type: ____________

Oven Heat Source: ____________

Probe Part Number: ____________

Unit of Measure Used: ____________

Top & Bottom of Zone Set to Different Tmepratures? Y / N

Oven Tunnel Length: ____________

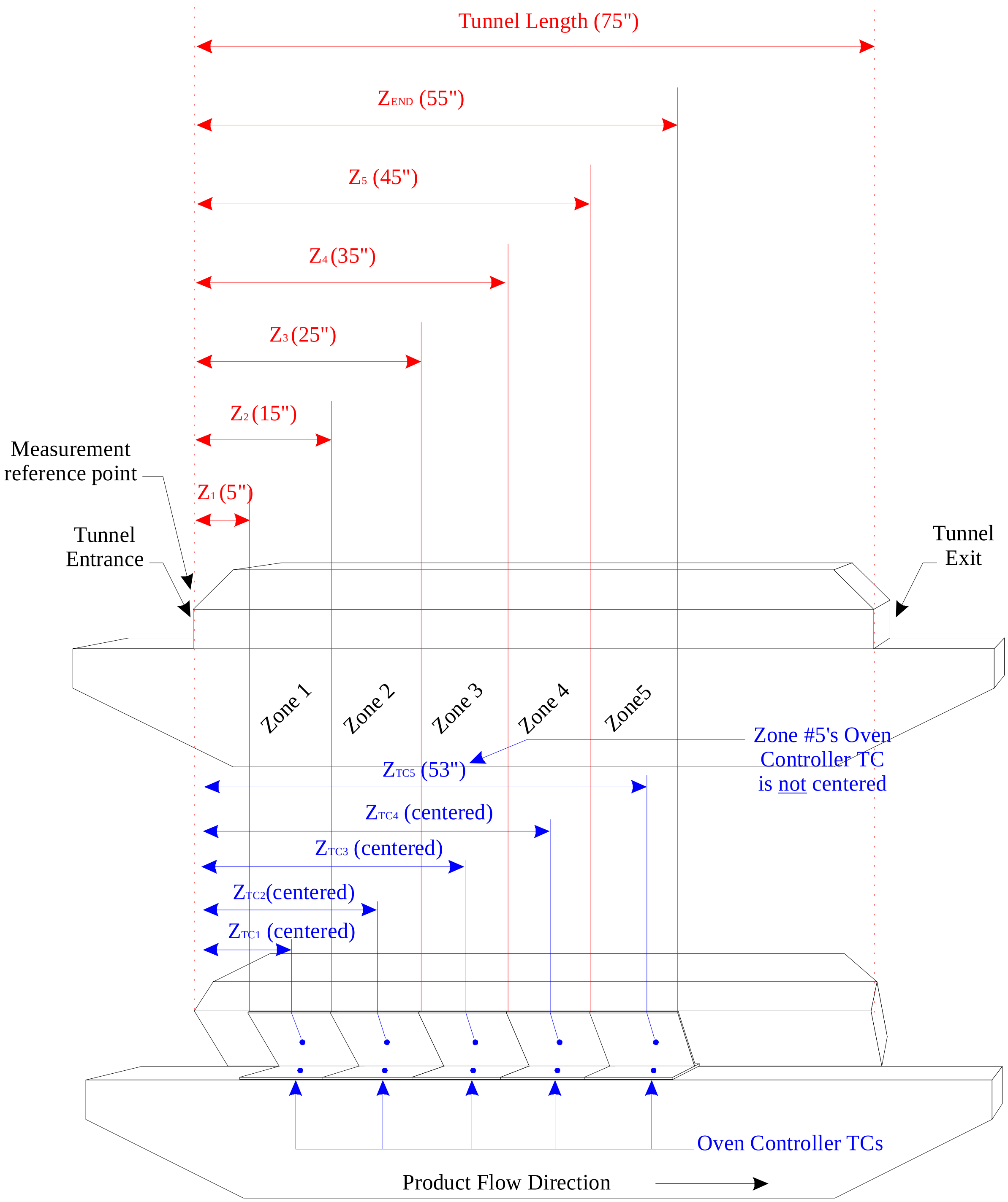
Oven Start Position (KICStart): ____________

Oven End Position (KICEnd): ____________

Distance from KIC$_{Start}$ to:

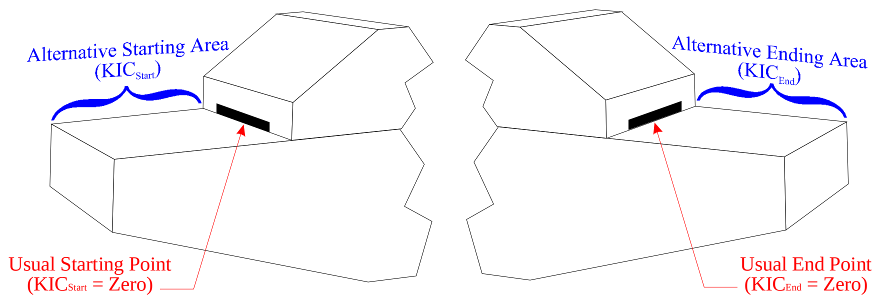
Start of Zone 1 (Z_1): ____________	Oven Control TC 1 (Z_{1TC}): ____________
Start of Zone 2 (Z_2): ____________	Oven Control TC 2 (Z_{2TC}): ____________
Start of Zone 3 (Z_3): ____________	Oven Control TC 3 (Z_{3TC}): ____________
Start of Zone 4 (Z_4): ____________	Oven Control TC 4 (Z_{4TC}): ____________
Start of Zone 5 (Z_5): ____________	Oven Control TC 5 (Z_{5TC}): ____________
Start of Zone 6 (Z_6): ____________	Oven Control TC 6 (Z_{6TC}): ____________
Start of Zone 7 (Z_7): ____________	Oven Control TC 7 (Z_{7TC}): ____________
Start of Zone 8 (Z_8): ____________	Oven Control TC 8 (Z_{8TC}): ____________
Start of Zone 9 (Z_9): ____________	Oven Control TC 9 (Z_{9TC}): ____________
Start of Zone 10 (Z_{10}): ____________	Oven Control TC 10 (Z_{10TC}): ____________
Start of Zone 11 (Z_{11}): ____________	Oven Control TC 11 (Z_{11TC}): ____________
Start of Zone 12 (Z_{12}): ____________	Oven Control TC 12 (Z_{12TC}): ____________

Oven Measurement Sheet



Oven Measurement Diagram (example)

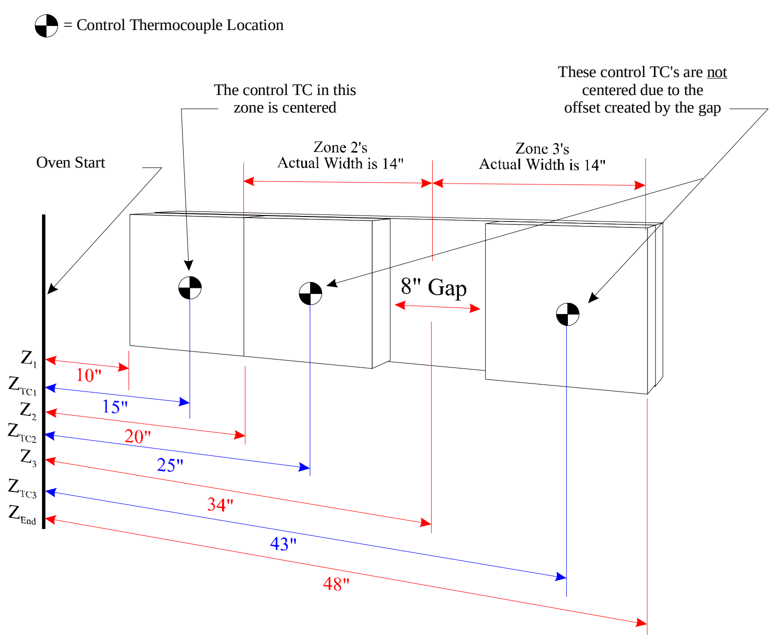
KIC$_{Start}$ and KIC$_{End}$ Positions



Explanation: Although the oven tunnel entrance and exit are usually used as the KIC$_{Start}$ and KIC$_{End}$ points, any visible reference point along the input and/or output tables of the oven can be used.

DO NOT use any point located on a piece of equipment (such as a workstation) with a different conveyor speed if you intend to accurately measure the Belt speed.

Example of typical oven start and end positions



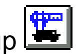
Example of oven “gap” measurements

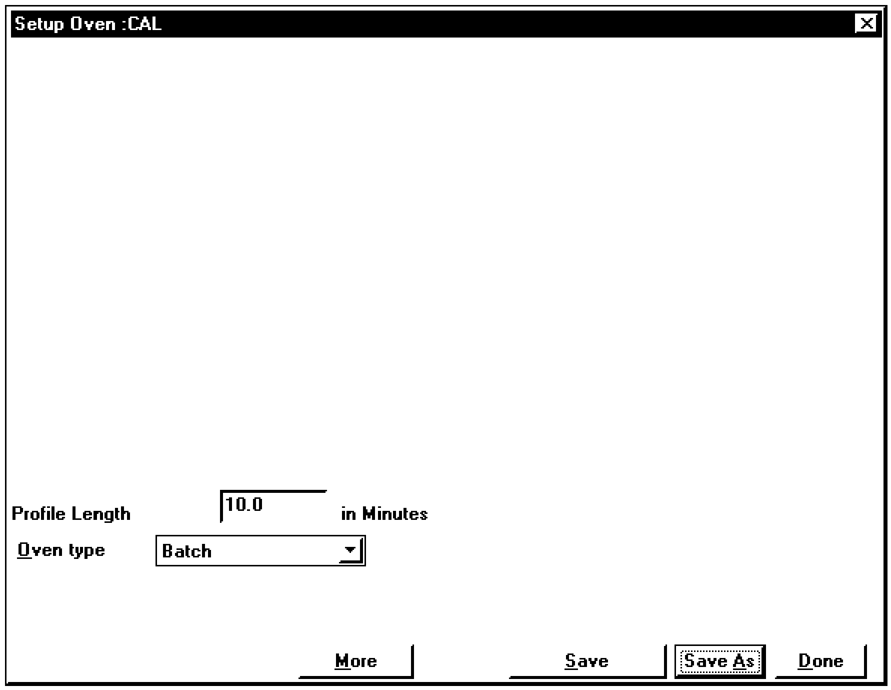
Non-Conveyorized Oven Setup

Non-conveyorized types are ovens that have no moving conveyor within them. The product is simply set inside a heating chamber and brought to one or more dwell temperatures for a time determined by the process specification.

Because non-conveyorized ovens are very uncomplicated (i.e., generally do not facilitate the use of KICprobes for monitoring), these are the easiest to setup.

To setup a non-conveyorized oven, perform the following steps:

- Select **Oven** from the **Setup** list menu or press the oven setup  icon. The **Setup Oven** dialog box will appear.



- Input how long the profile will last in minutes in the **Profile Length** field.
- From the **Oven Type** list menu, select a non-conveyorized process. The non-conveyorized oven processes include the following:
  - ✓ **Rework Station**
  - ✓ **Batch**

  Note: Select "Unknown" if your non-conveyorized process doesn't meet either of these descriptions.
- Select the **More** button to access other features that can be used to further refine the oven description. (more on these options at the end of this section)
- Select the **Save** button to save this new or edited oven setup to the hard drive.
- Select the **Done** button to exit from the **Setup Oven** dialog box.

Conveyorized Oven Setup

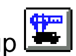
Conveyorized types are ovens that have a moving conveyor within them. The product is loaded onto the conveyor and is fed through the oven at a rate determined by your process standard.

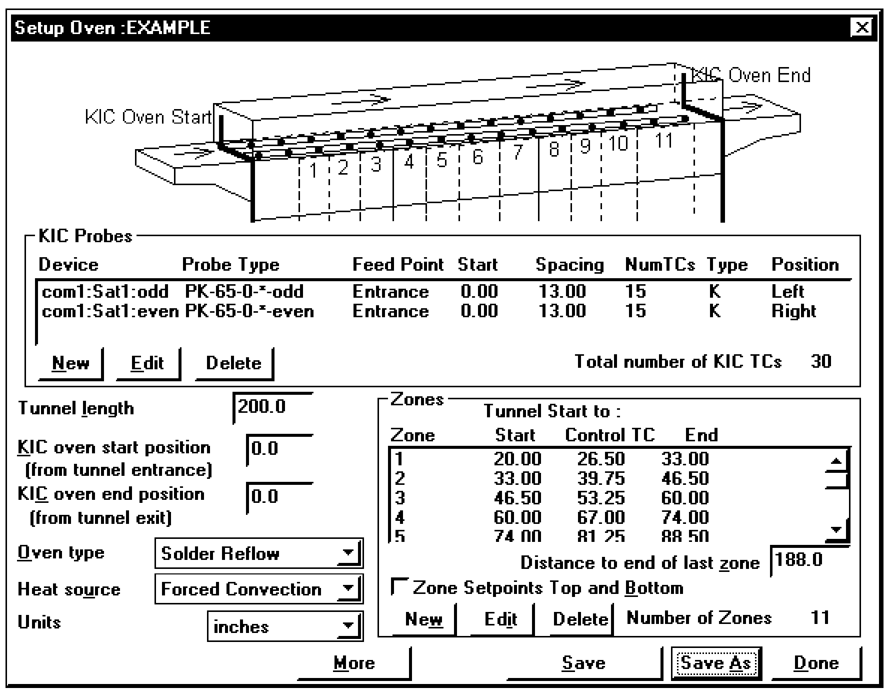
In most cases, KICprobes will be used to monitor the oven. If you are using KICprobes and the upper half of the Setup Oven dialog box is still blank, the Hardware Input Monitor has NOT been correctly setup. **You will need to go back to the Hardware Input Monitor (previous section) to correct this situation.**

If KICprobes are not used, you may disregard all references to the KICprobe setup. Additionally, the upper half of the Setup Oven dialog box will be blank, reflecting the lack of need to setup the KICprobes.

To setup a conveyorized oven, first ensure that you have properly performed the oven measurement and that this data is available for inputting in the KIC software.

Perform the following steps:

- Select **Oven** from the Setup list menu or press the oven setup  icon. The **Setup Oven** dialog box will appear.



- In the **Units** list menu, select the measurement units that will be used to describe this oven's geometry.

  Note: This should be the same as that used to perform the actual oven measurement, as recorded on the Oven Measurement Sheet.

- Input the length of the oven tunnel in the **Tunnel Length** field.
- Input the location that the product profile will start in the **KIC Oven Start Position**.

  Note: This should normally always be zero, unless you determine that the product profile should start at another point (outside the oven) because of machine restrictions.

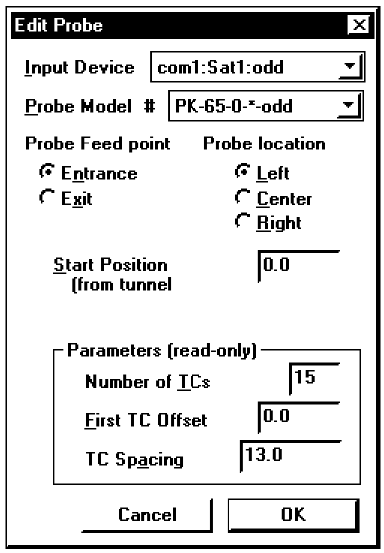
- Input the location that the product profile will end in the **KIC Oven End Position**.

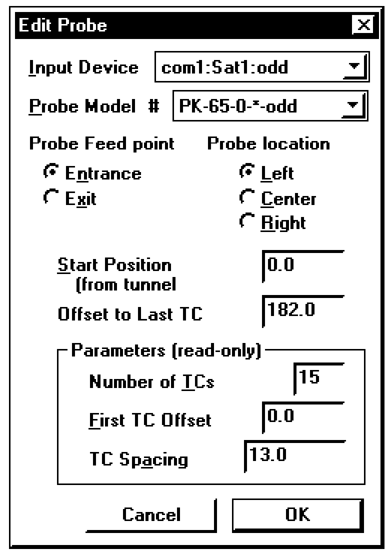
  Note: Again, this should normally always be zero, unless you determine that the product profile must end at another point (outside the oven) because of machine restrictions.

- From the **Oven Type** list menu, select the type of oven this is.

  *Note: If this is a wave solder oven, ensure that **Wave Solder** is selected. The KICprobe setup facilitates another feature used to define the exact placement of the last two thermocouples which is non-applicable to other conveyorized oven types.*

- From the **Heat Source** list menu, select the predominant method of heat transfer used.
- From the **KICprobe** group, click on the **New** button. The **Edit Probe** dialog box will appear.





- From the **Input Device** list menu, select the communication source that the ODD KICprobe temperature data will come from.
- From the **Probe Model #** list menu, select the ODD KICprobe part number as shown on the white heat shrink toward the connector end of the KICprobe.

  Note: If your KICprobe part number does not appear on this listing, this may indicate that your KICprobes are customized, and require a special setup. Contact KIC Tech Support for instructions on how to setup a customized set of KICprobes.

- If the datum of the KICprobe is physically located either inside or outside the oven entrance (i.e., not exactly at the oven entrance), input the offset value in the **Start Position** field.

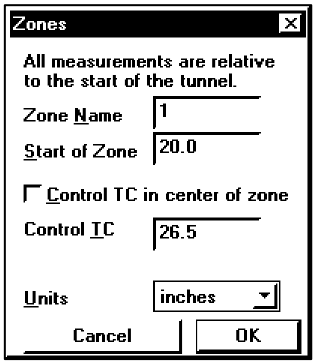
  Note: In most cases the KICprobe datum will always fall exactly at the oven entrance point (zero offset).

- If you are setting up a wave solder process, you will need to input the distance of the offset of the last thermocouple in the KICprobe in the **Offset to Last TC** field. This is the distance from the oven's tunnel entrance to the chosen position (typically the tip of the solder wave) of the last KICprobe thermocouple.
- Click on the **OK** button. You will be returned to the **Setup Oven** dialog box.

Note: Once the ODD KICprobe has been correctly setup, the KIC software will automatically setup the EVEN KICprobe accordingly. If you make a mistake in setting up the KICprobes, you may simply Delete the KICprobe and try again, or Edit the KICprobe already there.

If this setup is for a wave solder machine, you must edit the second KICprobe that was automatically setup by the KIC software in order to input the exact offset of the last thermocouple for that KICprobe. To do this, simply select the second KICprobe from the group list and click on the **Edit** button.

- From the **Zones** group, click on the **New** button. The **Zones** dialog box will appear.



- Input a name for the zone (up to 7 characters) in the **Zone Name** field. The zones are automatically labeled in numerical sequence if you choose not to give the zone an identifying name.
- In the **Units** list menu, select the unit of measure used. In most cases, this will be the same unit of measure used to describe the oven length. If this is the case, the correct unit of measure will already be selected for you.
- In the **Start of Zone** field, input the number of inches from the tunnel entrance that this zone begins, as reflected on your Oven Measurement Sheet.

  *Note: Remember that you are inputting ONLY the data for the zone start. With the exception of the last zone defined (described later in **Distance to the End of Last Zone**), the "end" of each zone is literally the start of the next zone.*

- If the oven's closed-loop control thermocouple is centered in this zone, select the **Control TC in Center of Zone checkbox** (default). If it is not, deselect this checkbox and input the distance from the oven's tunnel entrance that this control thermocouple is located.

  Note: Remember that if there is a "gap" between two zones, the control thermocouples within these two zones will, in most cases, not be centered.

- Click on the **OK** button. A new **Zones** dialog box will automatically appear to setup the next zone. Repeat these steps until all oven zones have been input.

  Note: As each zone is setup, you'll notice that the oven pictorial at the top of the Setup Oven dialog box will reflect the latest changes.

- Once the last zone has been setup, click on the **Cancel** button for the next **Zones** dialog box. You will be returned to the **Setup Oven** dialog box.
- In the **Distance to the End of Last Zone** field, input the distance from the oven entrance to the end of the last zone of the oven.
- Select the **Zone Setpoints Top and Bottom** checkbox if you will be adjusting the upper portion of the zones with different setpoints than the bottom portion of the zones.

  *Note: The oven model must be capable of facilitating this operation in order to use it. If your oven provides this feature, but you will not be implementing it, leave this **Zone Setpoints Top and Bottom** unchecked.*

- Select the **More** button to access other features that can be used to further refine the oven description. (more on these options at the end of this section)
- Select the **Save** button to save this new or edited oven setup to the hard drive.
- Select the **Done** button to exit from the **Setup Oven** dialog box.

SETUP/OVEN/MORE BUTTON

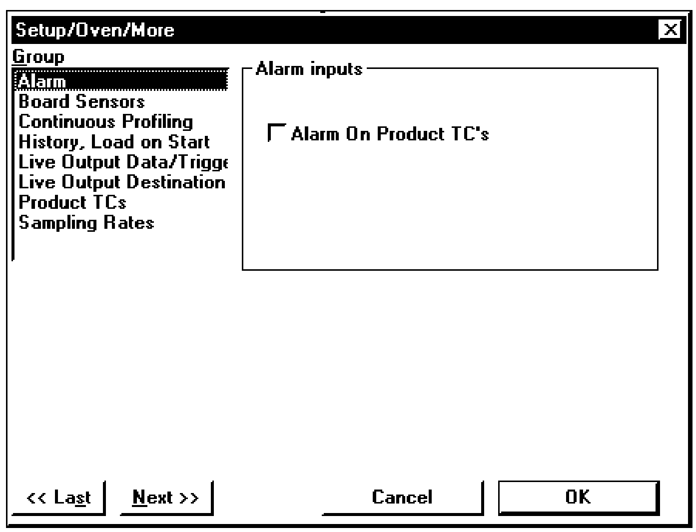
Other options are available to you that can help define that way your oven setup operates. These options are available only through the **Setup Oven** dialog box's **More** button.

As with any machine settings or adjustments you perform on other equipment, you should ensure that any changes to these settings are thoroughly documented in your process standard.

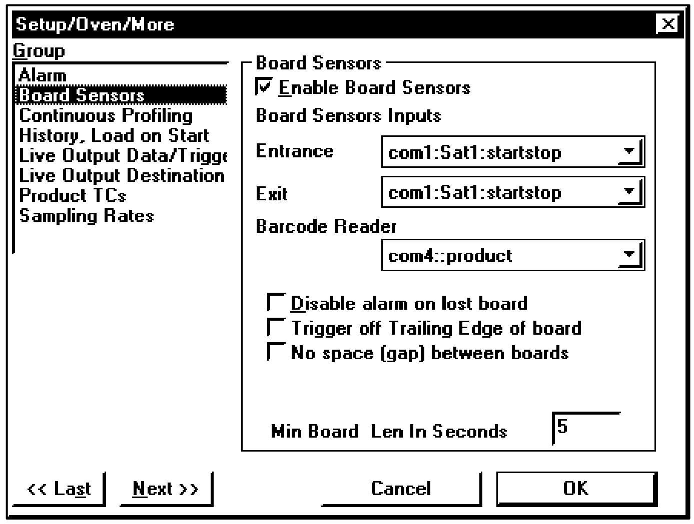
Like the oven setup, once changes are made to these settings, they should normally remain unchanged for the oven. However, if you later decide to implement optional features, such as *Live Data Output*, *QC-Calc SPC*, *Board Sensors*, or *Barcode Readers*, this is where the changes to your existing setup will take place. To learn more about these other options, contact your local KIC Representative or contact KIC Sales at (619) 673-6050.

ALARM GROUP

The Alarm group contains only a single feature, the **Alarm On Product TC's** checkbox. When selected, this will cause the KIC software to output an alarm when a user determined temperature has been reached, as setup in the KIC software's Statistics Table.



BOARD SENSORS GROUP (OPTIONAL)



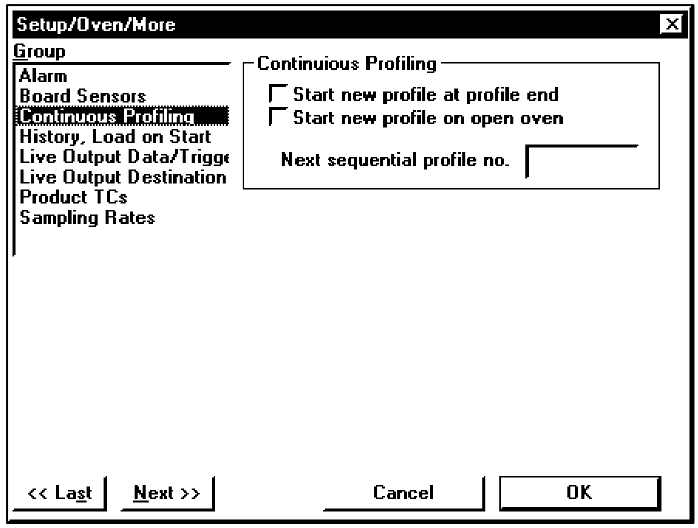
This optional feature provides the setup for both the Board Sensors and the Barcode Readers.

- If you will simply be implementing a Barcode Reader with the KIC software, select the computer's communication source (COM port) from the Barcode Reader list menu.

  Note: If you find that there are no options inside this list menu, you're Hardware Input Monitor has probably not been setup to accept this type of device. To correct this, go back into the Hardware Input Monitor and click on the ASCII inputs button to ensure that the BARCODE.DLL is selected for the COM port your barcode reader is attached to.

- Select the **Enable Board Sensors** checkbox to let the KIC software know that you will be using a Board Sensor system. When selected, additional options will appear within this group.
  - ✓ **Entrance** – Select the communications source from the list menu that the Oven will use for this Board Sensor system. This will typically be the same COM port and TPU that is already assigned in the **Setup Oven** dialog box for the KICprobes.
  - ✓ **Exit** – Select the communications source from the list menu that the Oven will use for this Board Sensor system. This will typically be the same COM port and TPU that is already assigned in the **Setup Oven** dialog box for the KICprobes.
  - ✓ **Min Board Len in Seconds** – Input the time duration (in seconds) that a Board Sensor must be activated before the KIC software will determine that a board has been found. This time duration will typically ensure that the KIC software will disregard momentary tripping of a Board Sensor by other means (i.e., hand accidentally placed over/under it) except an actual board.
  - ✓ **Disable Alarm on Lost Board** – If you choose not to have the KIC software cause an alarm when a board is detected entering the oven but is not detected leaving the oven when expected, select this checkbox.
  - ✓ **Trigger Off Trailing Edge of Board** – By default, the Board Sensor system will trigger a board "event" as measured from the leading edge of the board. There may be circumstances, such as a "push" type over loading device, that make using the trailing edge of the board more practical. Select this checkbox if you desire to have the Board Sensor system trigger based on the detection of the boards trailing end.
  - ✓ **No Space (gaps) Between Boards** – This is a special feature that is implemented only when the "product" (usually not SMT boards) is expected to be a continuous flow.

CONTINUOUS PROFILING GROUP



This group contains features that were originally developed to facilitate the continuous testing of the KIC software during alpha and beta development cycles. Many customers, upon seeing it, staunchly regarded these features as a "must" for a KIC software release. So here it is!

"Continuous" profiling simply means that the KIC software will perform continuous profiles, automatically recycling itself without the aid or intervention of the user, once started. Many customer's are implementing this feature on such things as batch ovens, temperature cycle machines, and various R&D projects.

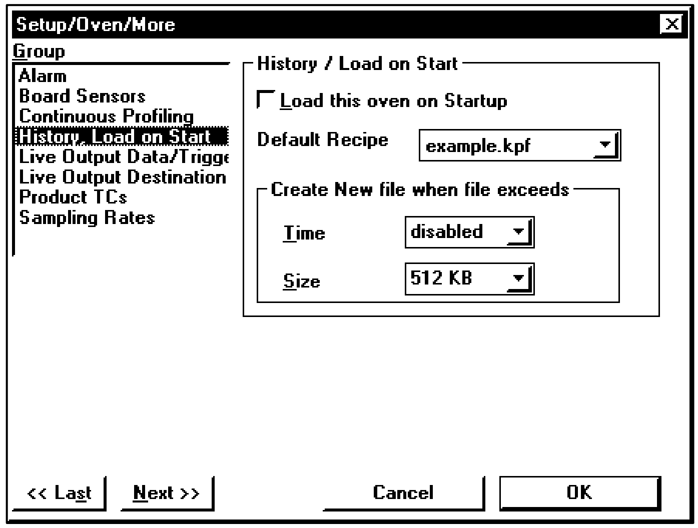
Here's how to use it:

- If you desire to have the KIC software automatically start another profile, triggered by the end of a previous profile, select the **Start New Profile at Profile End** checkbox.
- If you desire to have profile started immediately upon opening this oven setup, select the **Start New Profile on Open Oven** checkbox.
- In the **Next Sequential Profile No.** field, input an integer value for the first (typically the number one) or next profile to be performed. These numbers, automatically incremented by one for each profile cycle performed, are used in lieu of entering Profile Notes, which are usually manually input by the user at the start of each profile.

Once started, the sequence can only be stopped by entering this dialog box again and deselecting the automated features.

For the ultimate in automation, select everything! Not only will the profiling start immediately upon opening the oven, it will continue unabated until specially stopped by the user.

HISTORY / LOAD ON START GROUP



This group will provide a means of defining:

- Whether or not this oven will automatically load itself when the KIC software is started, and if so, which of it's recipes will automatically load itself as well (i.e., not user intervention required).
- How large the KIC system's historical files can be before closing out the last file and automatically starting a new file.

To change these features, perform the following steps:

- If you desire to have this oven setup automatically load each time the KIC software is started, select the **Load this Oven on Startup** checkbox.
- If you desire to have an already defined recipe loaded whenever the oven is automatically or manually started, select it from the **Default Recipe** list menu.
- If you would like the KIC software to automatically close the current history file and start a new history file based on a time limit, select this from the **Time** list menu.

  Note: Using Time as a limiting factor may provide some usefulness to customer who need to segregate the historical data based on work shifts.

- If you would like the KIC software to automatically close the current history file and start a new history file based on a file size limit (default of 1024KB), select this from the **Size** list menu.

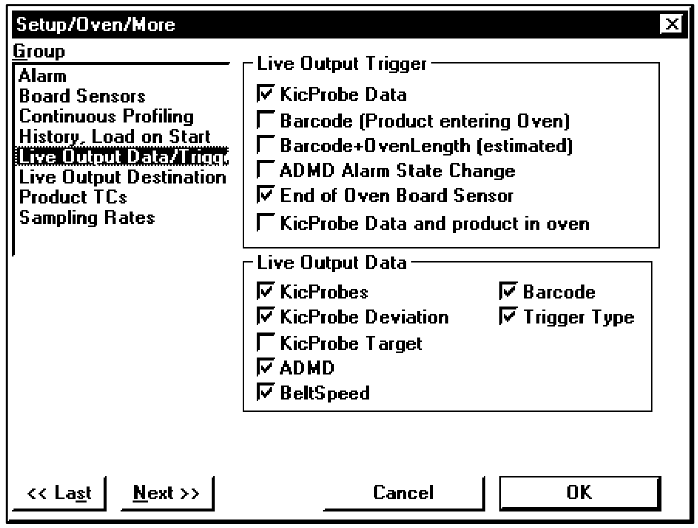
  Note: Most customers use a default limit of 1024KB or less because they can be easily copied to and a 3½" floppy disk without the need for a compression utility.

You can use both Time and Size as limiting factors for the file size. A new history file will automatically be created as determined by whichever limit is reached first.

However, do not under any circumstances select **Disable** for both of these limits. The result will be one large continuous history file on your hard drive which may have other consequences depending upon the computer operating system you're using.

LIVE OUTPUT DATA/TRIGGER GROUP (OPTIONAL)

This optional group contains the utility for selecting which KIC system data to output in real-time, and what events will "trigger", or cause the KIC software to send it.



To use it, perform the following steps:

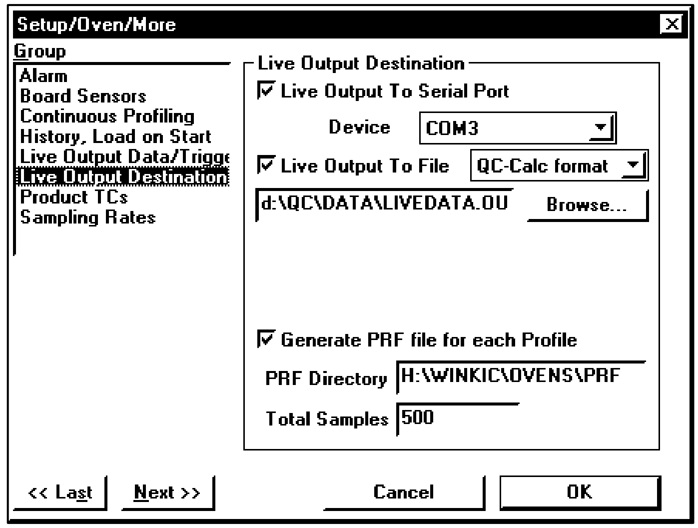
- **PLAN!** – Thoroughly devise a plan for collecting and maintaining the Live Output data. Without proper planning, you may end-up collecting endless mounds of data, without a clue as to what's what, or even what to do with it.
- From the **Live Output Trigger** group, select one or more "triggers" that will cause output to occur.
  - ✓ **KICprobe Data** – This is the simplest trigger to implement. Any time that data from the KICprobes are collected by the KIC software, the select Live Data will be output. This frequency is set in the Sampling Rates group of the Setup/Oven/More dialog box (further down in this section).
  - ✓ **Barcode (Product Entering Oven)** – This trigger will occur whenever a properly setup barcode reader scans a product barcode.
  - ✓ **Barcode + Oven Length (estimated)** – This trigger will occurs each time a barcode has been successfully scanned at the oven entrance and the product has finished traversing the oven's estimated length.
  - ✓ **ADMD Alarm State Change** – This trigger occurs whenever the Average Deviation or Maximum Deviation traverses between their 3 alarm states (good, warning, alarm) in any direction.

    Note: This does not apply to alarms caused by the user defined limitations in the Statistics Table or the KICprobe Stability.
  - ✓ **End of Oven Board Sensor** – This trigger will occur whenever the Board Sensor (optional feature) at the end of the oven detects a board.
  - ✓ **KICprobe Data and Product in Oven** – This trigger will occur each time the TPU is sampled for oven temperature data and a board is known to be inside the oven, as detected by the Board Sensor at the oven entrance. This prevents superfluous data from being output whenever the oven is idle and the output temperatures have little or no bearing on product quality.
- From the **Live Output Data** group, select one or more fields of data to be output whenever any of the trigger events occur:
  - ✓ **KICprobes** – This data consists of all the raw thermocouple values of the KICprobes.
  - ✓ **KICprobe Deviation** – This data consists of the individual deviation data for each KICprobe thermocouple. This field can only be used when a Virtual Profile has previously been created and is currently in use.

- ✓ **KICprobe Target** – This data consists of the individual KICprobe Target values, as established at the start of the product profile subsequently used to create the Virtual Profile. This field can only be used when a Virtual Profile has previously been created and is currently in use.
- ✓ **ADMD** – This data consists of the Average and Maximum Deviation values as well as the identifier for the Maximum Deviation thermocouple. This field can only be used when a Virtual Profile has previously been created and is currently in use.
- ✓ **Beltspeed** – This data consists of the calculated belt speed measurement for the oven's entire length, as detected by the entrance and exit sensors of the Board Sensor system. This field is only available through the use of the Board Sensor option.
- ✓ **Barcode** – This data simply consists of the barcode number read directly off the products barcode label. This field is only available through the use of the Barcode Reader option.
- ✓ **Trigger Type** – This is a "tag" or identifier that can additionally be output with other data that identifies which trigger event cause the output of that particular data to occur. This is most useful when employing two or more trigger types and you need to be able to segregate the output data by the events that caused the trigger.

For more information about the data output structures, please refer to the Software section of this document.

LIVE OUTPUT DESTINATION GROUP (OPTIONAL)

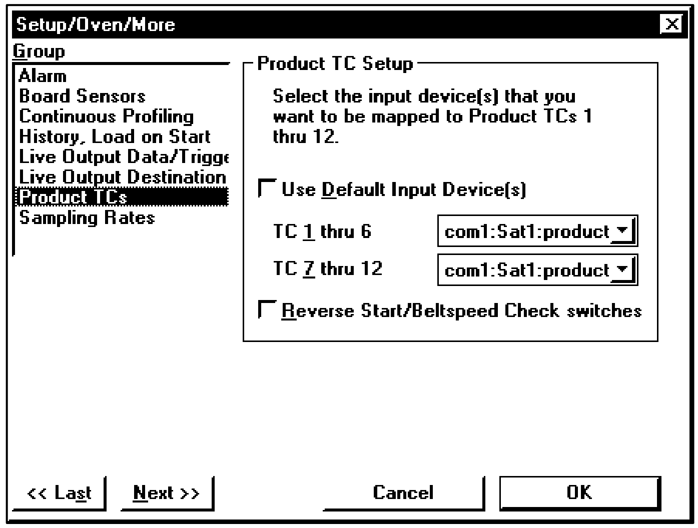


This optional group contains the utility for determining where the Live Output data will be sent.

To use this optional feature, following these steps.

- **PLAN!** – Thoroughly devise a plan for collecting and maintaining the Live Output data. Without proper planning, you may end-up collecting endless mounds of data, without a clue as to what's what, or even what to do with it.
- If you will be sending Live Data output through a computer COM port to another machine, select the **Live Output to Serial Port** checkbox.
  - ✓ From the **Device** list menu, select which COM port this Live Data will be sent to.
- If you will be sending Live Data output to a file on either a local or network hard drive, select the **Live Output to File** checkbox.
  - ✓ From the list menu, select either **KIC Format** or **QC-Calc Format**.
  - ✓ Input the **file path** and **name** that will be used to write the Live Output.

PRODUCT TCs GROUP



This group provides the capability of:

- Re-defining the source of the product thermocouple data as some device other that the default TPU assigned for the KICprobes.

  Note: You should normally never redefine these settings without *<u>first</u>* *consulting KIC Technical Support. Improper use or assignments of these settings can have unforeseen side-effects and consequences.*

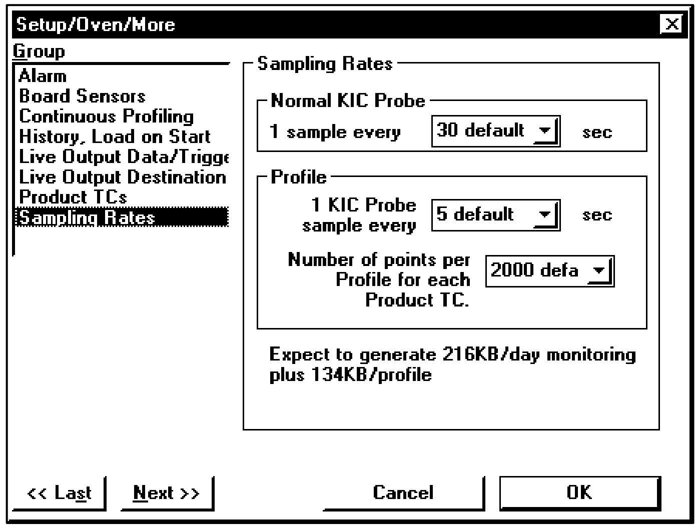
- Reversing the default functions of the Start and Belt Speed Check switches.

To use these features, perform the following steps:

- By default, the **Use Default Input Devices** checkbox is selected. Deselecting this checkbox will cause the following items to appear:
  - ✓ TC 1 thru 6 – Select the new data source for thermocouples 1 through 6 of your product profile.
  - ✓ TC 7 through 12 – Select the new data source for thermocouples 7 through 12 of your product profile.
- To reverse the functionality of the Start/Belt Speed check switches, (for whatever purpose you deem necessary) simply select the **Reverse Start/Beltspeed Check Switches** checkbox.

  Note: By default, the button on the top of the older 303 Thermal Receiver, and the upper position of the momentary throw switch on the face of the newer 303 and 433 Thermal Receivers are the START switches. The Belt Speed Check cable and/or the lower position of the momentary throw switch on the face of the newer 303 and 433 Thermal Receivers are the Belt Speed Check switches.

SAMPLING RATES GROUP



This group provides control for:

- The frequency with which raw temperature data is collected from the KICprobes when no profile is being run.
- The frequency with which raw temperature data is collected from the KICprobes during a profile run.
- The maximum number of data points per product thermocouple allowed.

The KIC system will normally increase it's data collection frequency when profiles are being run. This extra amount of "buffered" data is instrumental in increasing the resolution of the Virtual Profile and Profile Prediction algorithms in the KIC software.

Once the profile is finished, the KIC software will "down-shift" it's data collection frequency to it's normal idle state.

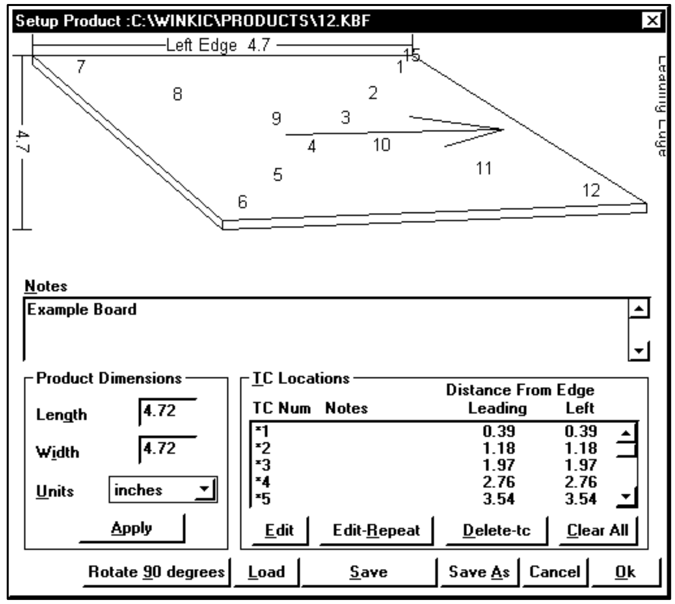
To change these features, perform the following steps:

- From the **Normal KICprobe** group list menu, select the frequency (in seconds) with which the KIC software should accept data from the KICprobes when no profiles are being run. (default is 30 seconds)

  Note: As you experiment with these values, you should closely observe the bottom of the dialog box of information about how much hard drive memory will be used per day, based on the setting you've selected.

- From the **Profile** group:
  - ✓ Select the sampling frequency for the KICprobes when running a profile in the **1 KICprobe Sample** list menu. (default is 5 seconds)
  - ✓ Select the maximum allowable number of data points per thermocouple from the **Number of Points per Profile for Each Product TC** list menu.

Product Setup

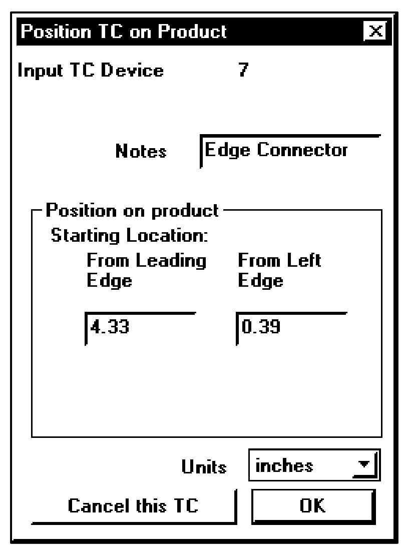


To properly profile your product, the KIC software requires dimensional information about the product as well as the X/Y coordinates of the thermocouple placements on the product. A new product setup should be performed for each unique product you process.

To setup a new product, perform the following steps:

- Select **Product** from the Setup list menu or press the product setup icon. The **Setup Product** dialog box will appear.
- From the **Units** list menu, select the unit of measure that will be used to measure this product.
- Input the length of the product in the **Length** field. Length is generally the dimension that coincides with the direction of the product as it travels through the oven.
- Input the width of the product in the **Width** field. Once these dimensions are input, click on the **Apply** button to have them take affect.

  Note: You may notice a pictorial of the product board being redrawn on the upper portion of the dialog box.
- If this is the first time you will be editing the product, click on the **Edit-Repeat** button from the **TC Locations** group. The **Position TC on Product** dialog box will appear.



- From the **Units** list menu, ensure that the correct unit of measure is being used.
- Input a description of the thermocouple location in the **Notes** field. Up to 15 characters are allowed.
- Input the distance of the thermocouple tip location from the leading edge of the board in the **From Leading Edge** field. The leading edge of the board is that part of the board that enters the oven first.
- Input the distance of the thermocouple tip location from the left edge of the board in the **From Left Edge** field.
- Click on the **OK** button. The current **Position TC on Product** dialog box will disappear and a new dialog box for the next sequential

thermocouple will appear.

- Repeat these steps until all thermocouple positions have been entered.
- When you have entered the last thermocouple position, click the **OK** button and another dialog box will appear. Click the **Cancel this TC** button this time. You will be returned to the **Setup Product** dialog box.
- Click the **Save** button if this is the first time you've created this product, otherwise, click on the **Save As** button if you are editing a previous product setup and wish to save this edited setup as a new file.

Recipe Setup

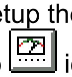
The recipe is also known as the “process”. Recipe is a name that many oven manufacturers nowadays use to reference the items on the oven that control the process, such as conveyor width and speed, air-flow or pressure, temperature setpoints, etc.

In the KIC software the recipe is used to describe the temperature setpoints for each of the oven’s zones as well as the belt speed of the conveyor.

Note: The two criteria that determine which setup groups appear on the Setup Recipe dialog box are whether or not the oven is a conveyorized type, and if so, whether or not KICprobes are being employed to continually monitor the oven’s temperatures.

When setting up a new recipe, first ensure that you have the correct Product file loaded. When you are finished setting up this recipe, you will save it. Saved with the recipe information is the name of the product file that was loaded. This will associate the product with the recipe later on.

The next time you load the new recipe, the associated product will automatically load with it. You can always reload a different product at another time and save the recipe again to create a new association.

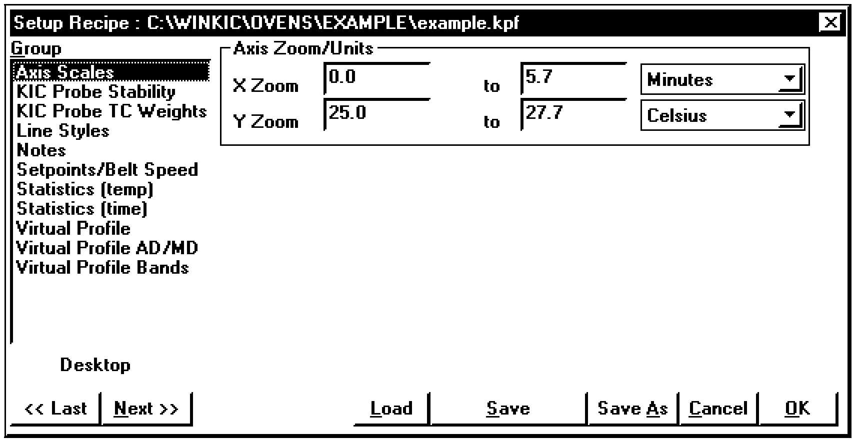
To setup the Recipe, select **Recipe** from the Setup list menu or press the recipe setup  icon. The **Setup Recipe** dialog box will appear.

The groups available in the Setup Recipe dialog box are:

- **Axis Scales** – Provides control over the axis scales used on the X/Y-graph.
- **KICprobe Stability** – Provides a means of determining the stability of the oven.
- **KICprobe TC Weights** – Will provide a means of adjusting the raw temperature data values used to perform some calculations.
- **Line Styles** – Provides control over how things are drawn on the X/Y-graph.
- **Notes** – Used to keep notes of the recipe setup.
- **Setpoints/Belt Speed** – Used to input which zones temperatures and conveyor speed are used for the recipe.
- **Statistics (temp)** – Will provide a means for selecting temperature based related statistics for viewing in the Statistics Table.
- **Statistics (time)** – Will provide a means for selecting time based related statistics for viewing in the Statistics Table.
- **Virtual Profile** – Provides access to creating and deploying a Virtual Profile.
- **Virtual Profile AD/MD** – Will provide a means of defining and using the Average Deviation and/or Maximum Deviation values and alarms.
- **Virtual Profile Bands** – Will provide a means of defining a tolerance band around the Virtual Profile.

AXIS SCALE GROUP SETUP

By default, the KIC software will attempt to always “fit” all data onto the X/Y-graph. This usually involves automatically resizing the graph to do so. The **Global Preferences** dialog box provides a checkbox to disable this feature.

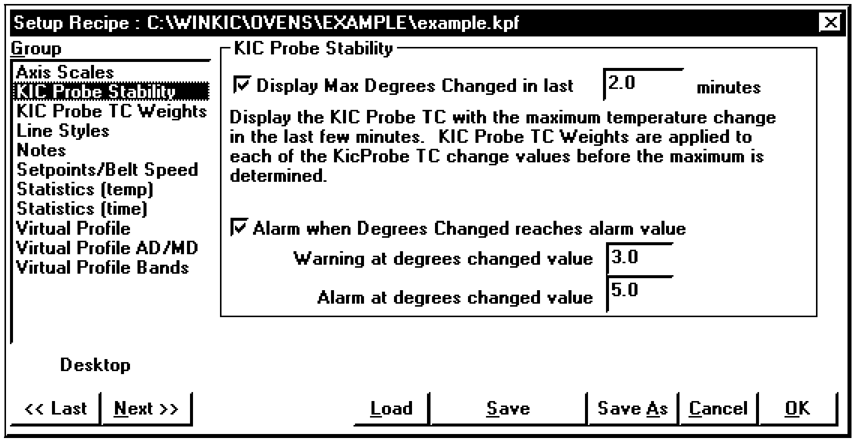


Despite which values you use for the X-scale, this dimension is actually determined and controlled by the Oven Setup tunnel length and Recipe Setup belt speed in the case of conveyorized ovens, or Oven Setup profile time length in the case of a non-conveyorized ovens.

- Select the unit of measure for the X-scale form the list menu.
- Select the unit of measure for the Y-scale from the list menu.
- Input the lower and upper limits of each scale in their respective input fields.

KICPROBE STABILITY GROUP SETUP

This group will not appear in this dialog when KICprobes are not assigned in the Setup Oven dialog box.



The KICprobe Stability is a measure of greatest temperature change in any of the KICprobe thermocouples over a user defined frame of time, and is completely independent of the Virtual Profile. The live KICprobe stability information, when selected for viewing, is displayed in the Data Times section of the KIC software screen.

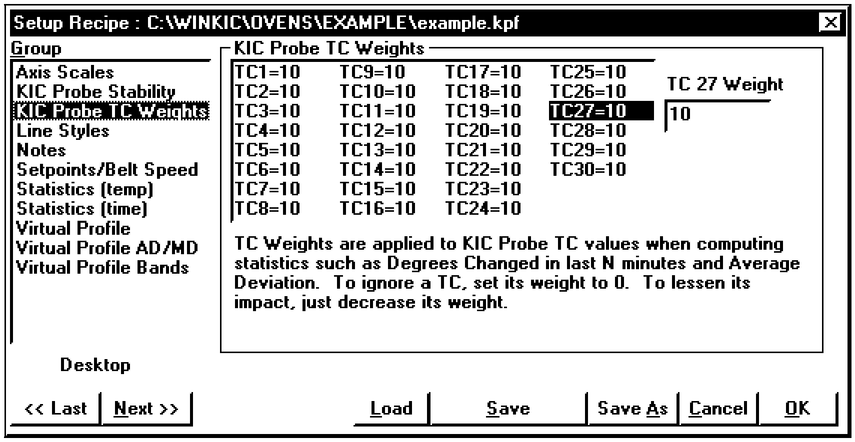
This value is significant where the overall stability of the oven needs to be determined prior to running a profile, or when the oven is in undergoing a changeover from one product recipe to another. The **KICprobe TC Weights** affect the raw data values used to determine the stability.

Use this value to help document the average amount of time required for the oven to stabilize between product changeovers.

- If you would like to display the KICprobe Stability in the KIC software Data Times area of the main screen, select the **Display Max Degrees Changed in Last** checkbox.
- Input the time frame you would like to use as a reference for the stability (default is 2 minutes).
- If you would like to use the KICprobe Stability settings to activate the KIC Alarm Relay or a PLC device (both optional) select the **Alarm When Degrees Changed Reaches Alarm Value** checkbox.
- Input the temperature value you will use to have the KICprobe Stability cause a warning in the **Warning at Degrees Changed Value** field.
- Input the temperature value you will use to have the KICprobe Stability cause an alarm in the **Alarm at Degrees Changed Value** field.

KICPROBE TC WEIGHTS GROUP SETUP

This group will not appear in this dialog when KICprobes are not assigned in the Setup Oven dialog box.



The KICprobe TC Weights provide an alternative method of adjusting the KICprobe thermocouple raw temperature to an amount approximately equivalent to the other raw values. They are only applied to the KICprobe Stability, Average Deviation (AD), and Maximum Deviation (MD) values.

Adjusting these values should only be performed where temperature range or movement is somewhat extreme. We highly recommend that you first investigate the root-cause of the "excessive" variation prior to using the KICprobe TC weights. If some other form of corrective action is appropriate, it should be considered first.

If you determine that the variation is normal and decide to use the KICprobe TC weights as a means of bringing that data inline with the other data, perform a thorough study first to determine what the appropriate value should be.

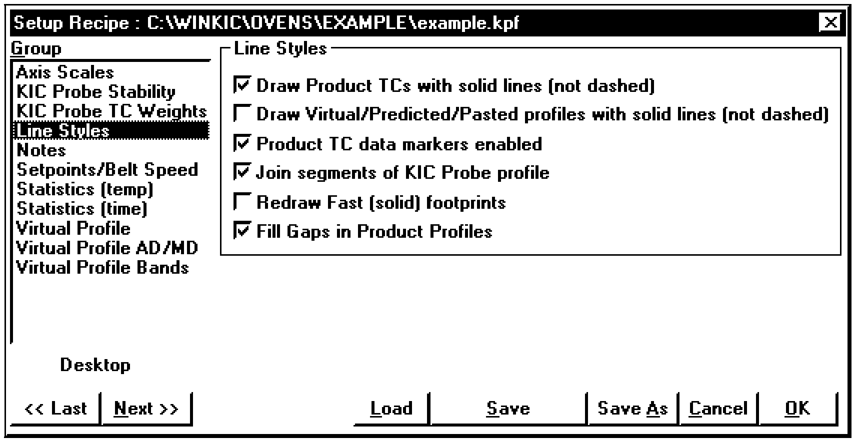
- From the list, select the thermocouple you wish to adjust the weight for. An input field identifying the thermocouple you selected will appear on the right side of the dialog box.
- Input the new weight value (integer only) for this thermocouple in the input field.

  By default, all the thermocouple weights are "10", or 100% of the actual value if never changed. A weight of 1 equates to 10%, a weight of 6 equates to 60%, a weight of 11 equates to 110%, etc.

  A weight of 0 (zero) is used as a means of having the KIC software completely disregard the value altogether. Never arbitrarily select this value without first thoroughly studying the implications of doing so.

LINE STYLES GROUP SETUP

This group contains items that affect the drawing of objects on the X/Y-graph that represent various types of data.



- Select the **Draw Product TCs with Solid Line** checkbox (default ON) if you would like the product thermocouples to be represented on the X/Y-graph with solid colored lines.
- Select the **Draw Virtual/Predicted/Pasted Profiles with Solid Lines** checkbox (default OFF) if you would like these data represented by solid colored lines.

  Note: This item will not appear in this group when KICprobes are not assigned in the Setup Oven dialog box.
- Select the **Product TC Data Markers Enabled** checkbox (default OFF) if you would like to display markers for each point of data on the X/Y-graph.

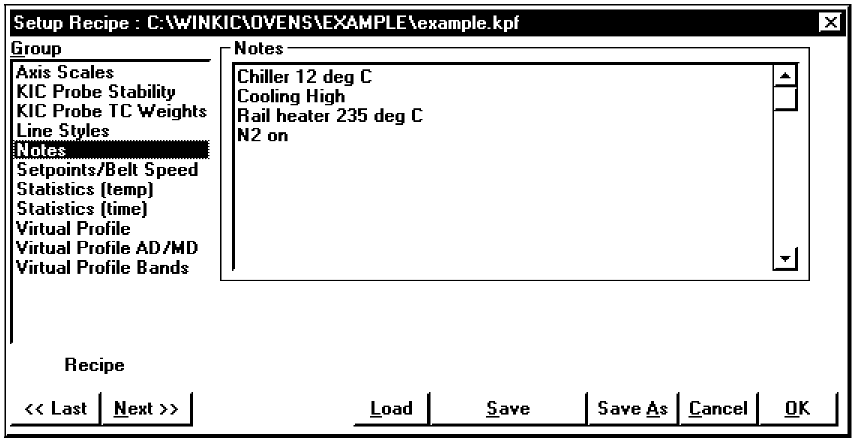
  Note: Use this feature sparingly, as it is very graphic dependent and will slow your system down. Use them only as an analysis tool when zooming-in on a particular area of the profile, then switch them off when you've finished.
- Select the **Join Segments of KICprobe Profile** checkbox (default ON) to have each segment of the KICprobe display on the X/Y-graph joined.

  Note: This item will not appear in this group when KICprobes are not assigned in the Setup Oven dialog box.
- Select the **Redraw Fast (solid) Footprints** checkbox (default ON) to have the KICprobe footprint redraw fast on the X/Y-graph. If you're using a slower computer, select this checkbox.

  Note: This item will not appear in this group when KICprobes are not assigned in the Setup Oven dialog box.
- Select the **Fill Gaps in Product Profiles** checkbox (default ON) to have minor gaps in the temperature profile automatically filled at the end of each profile run.

NOTES GROUP SETUP

As a general practice, you should input some applicable notes about the recipe whenever possible.



Whenever a new Recipe is loaded, the recipe name and the first line of the Notes contents will appear on the Event Browser if selecting for viewing.

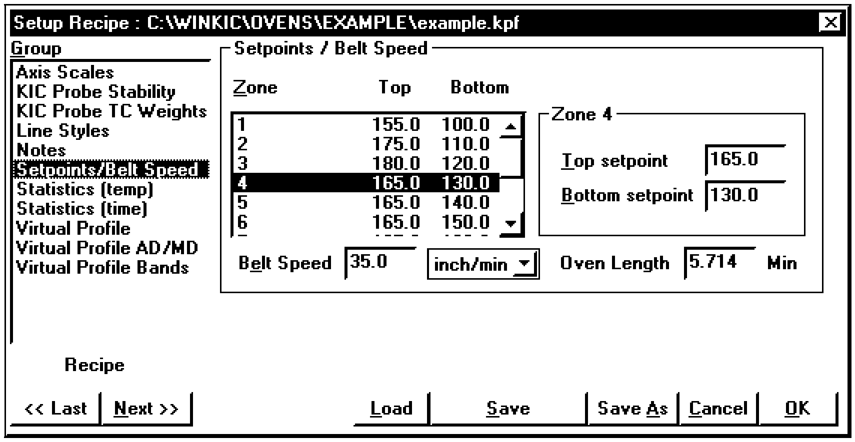
Some suggestions for the notes:

- Name or initials of the user creating or editing the recipe.
- Any special settings beyond what is already available in the recipe setup:
  - ✓ Gas used (i.e., air or nitrogen)
  - ✓ Gas-flow used (cfm)
  - ✓ Rail Heater ON or OFF
  - ✓ Cooling section settings (i.e., input/output water temperature, flow & pressure)
- Any other unique situation or conditions surrounding the use of the recipe.

  Note: The addition of the date and time the recipe was created or last edited is not necessary as this information is derived from the computer's date and time appended to the file when saved.

SETPOINTS/BELT SPEED GROUP SETUP

This group is the crux of the recipe setup. This is where input the zone temperature setpoints and belt speed.



In most cases, only one temperature setpoint per zone is required. However, if you selected the Zone Setpoints Top and Bottom checkbox in the Setup Oven dialog box for this oven, it will be necessary to input two temperature setpoints – one for the top, and one for the bottom.

New to this version of the KIC software is the addition of the **Oven Length** field, next to the **Belt Speed** field. These two fields are inter-linked, in that the act of changing one will change the other.

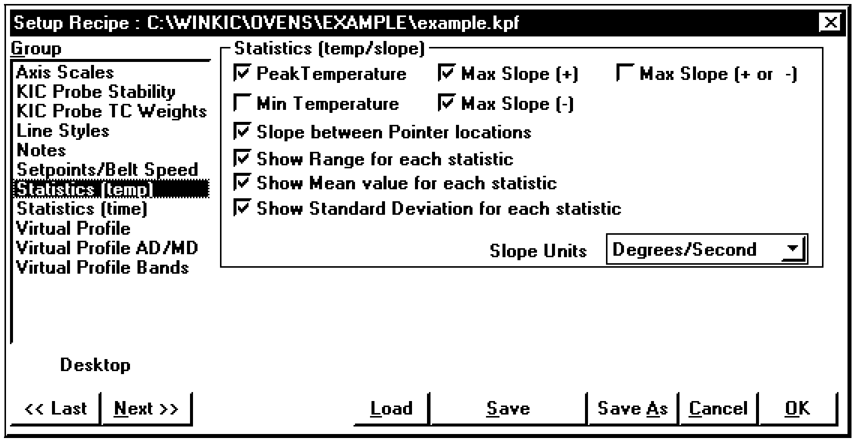
Oven Length is used to input “how much time” the product should stay inside the oven. When this time is input, the **Belt Speed** field will automatically update to the calculated belt speed required to achieve this time.

In the surface mount industry, this type of specification is generally not used. Instead, you should use the Belt Speed field (distance/time) for your specification.

- Select the oven zone you wish to edit. Depending on the Oven Setup, one or two (Top Setpoint and Bottom Setpoint) input fields will appear to the right of the zone list box.
- Input the zone setpoint temperature(s).
- The Belt Speed can be edited in one of two ways:
  - ✓ If using rate (distance/time) as the basis for your specification, first ensure that the correct unit of measure is selected from the provided list menu, then input the **Belt Speed**. Once updated, the **Oven Length** field will change to reflect the total time the product will be in the oven (tunnel entrance to tunnel exit).
  - ✓ If using “total time in the oven” as the basis for your specification, input this time (always in minutes) in the **Oven Length** field. Once updated, the **Belt Speed** field will change to reflect the rate (distance/time) of movement of the conveyor. If the unit of measure is wrong, simply select another reference from the list menu provided.

STATISTICS (TEMP) GROUP SETUP

The items in this group, when selected, will appear on the KIC software's Statistics Table.

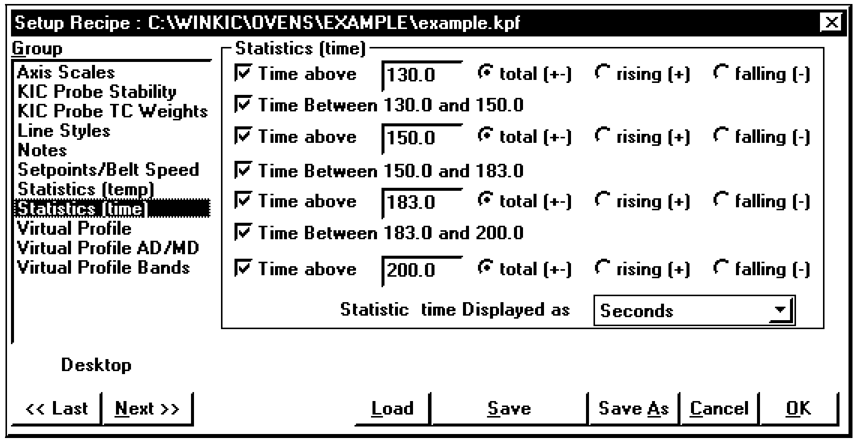


A summary of each follows:

- **Peak Temperature** – This will display the highest measured temperature of each thermocouple used to profile the product.
- **Min Temperature** – This will display the lowest measured temperature of each thermocouple used to profile the product.
- **Max Slope (+)** – This will display the greatest rising slope (temperature/time) of each thermocouple used to profile the product.
- **Max Slope (-)** – This will display the greatest falling slope (temperature/time) of each thermocouple used to profile the product.
- **Max Slope (+ or -)** – This will display the greatest slope, whether rising or falling, of each thermocouple used to profile the product.
- **Slope Between Pointer Locations** – When selected, will automatically calculate and display the slopes between two Pointers placed by the user on the X/Y-graph.
- **Show Range for Each Statistic** – This is a summary statistic, and will calculate the Range of the statistics in the column.
- **Show Mean Value for Each Statistic** – This is a summary statistic, and will calculate the Mean of the statistics in the column.
- **Show Standard Deviation for Each Statistic** – This is a summary statistic, and will calculate the Standard Deviation of the statistics in the column.

STATISTICS (TIME) GROUP SETUP

The items in this group, when selected, will appear on the KIC software's Statistics Table.



A summary of each follows:

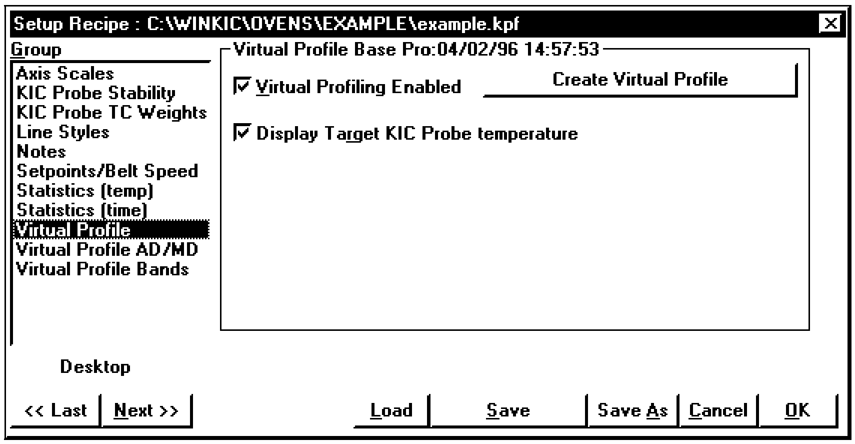
- **Time Above** – This provides information about how long the profile data has spent above a user defined temperature. Four user definable temperatures are provided.
  - ✓ **Total** – Select this radio button to have the Time Above temperature expressed as a total (rising+falling) of the time spent above the user defined temperature.
  - ✓ **Rising** – Select this radio button to consider only the time the profile data spent rising from the user defined temperature to the peak temperature.
  - ✓ **Falling** – Select this radio button to consider only the time the profile data spent falling from it's peak temperature back to the user defined temperature.
- **Time Between** – This provide information about how long the profile data has spent between two user defined (see Time Above) temperatures. It is not necessary for the Time Above checkbox to be selected in order to use this feature, however, a user defined Time Above reference temperature must be input.

VIRTUAL PROFILE GROUP SETUP

This group is only available for use if KICprobes are installed. This is the entry way into using a product profile as the baseline for create a Virtual Profile.

Given the currently measured KICprobe thermocouple temperatures and the baseline product profile used to create it, a Virtual Profile uses the power of simulation to continually predict what the product profile of the product you process through the oven. This information is saved and stored to your computer's hard drive.

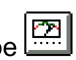
This method continually provides you with documented "evidence" of the oven's thermal condition 24 hours a day.



To use this feature, perform the following steps:

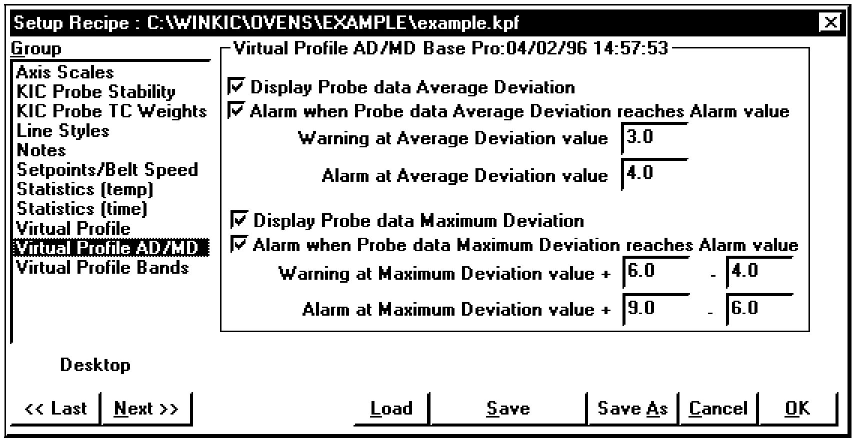
- Run a baseline profile with your product and determine if it meets your process specifications.

  Note: If the profile does not meet your specifications, use the Profile Prediction tool, or the Auto-Predict (optional) feature to optimize the profile.

- From the Setup list menu select **Recipe**, or click on the Setup Recipe  icon.
- Select the Virtual Profile group.
- Click on the **Create Virtual Profile** button. The **Virtual Profiling Enabled** checkbox will automatically become selected and the **Display Target KICprobe Temperature** option (checked) will appear.
- Click on the **Save** button to save this Virtual Profile with the Recipe.
- Click on the **OK** button to exit. The Virtual Profile is now displayed on the X/Y-graph and will automatically update each time new temperature data from the KICprobe thermocouples are received.
- To deselect viewing of the KICprobe Target Temperatures from the graph, deselect the **Display Target KICprobe Temperature** checkbox.
- To cease using the Virtual Profile, deselect the **Virtual Profiling Enabled** checkbox. Saving the recipe after deselecting the Virtual Profile will necessitate having to re-create the Virtual Profile if you choose to use it again at a later date.

VIRTUAL PROFILE AD/MD GROUP SETUP

This group is only available for use if KICprobes are installed and a Virtual Profile has been created.



This group provides the capability of:

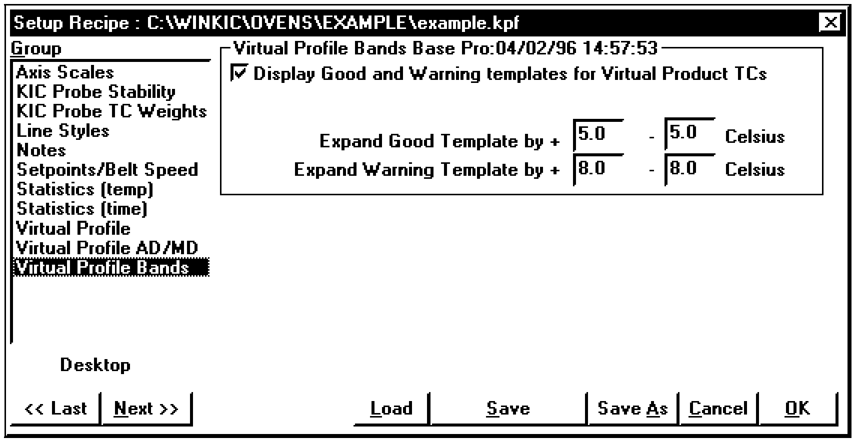
- Viewing or hiding the display of the Average Deviation (AD) and Maximum Deviation (MD) values on the main screen.
- Toggling the alarm if the user defined limitations for either the AD or MD are met or exceeded.
- Defining the limitations for the warning and alarm values of the (AD) and (MD).

To use these features, follow these steps:

- To display the AD on the main screen, select the **Display KICprobe Data Average Deviation** checkbox.
- To activate the alarm (software, KIC Alarm Relay, or PLC Cable) when the AD exceeds the designated alarm value, select the **Alarm when KICprobe Data Average Deviation Reaches the Alarm Value** checkbox.
- Input the limitation the KIC software will use to determine when to issue a Warning condition for the AD in the **Warning at Average Deviation Value** field.
- Input the limitation the KIC software will use to determine when to issue an Alarm condition for the AD in the **Alarm at Average Deviation Value** field.
- To display the MD on the main screen, select the **Display KICprobe Data Maximum Deviation** checkbox.
- To activate the alarm (software, KIC Alarm Relay, or PLC Cable) when the MD exceeds the designated alarm value, select the **Alarm when KICprobe Data Maximum Deviation Reaches the Alarm Value** checkbox.
- Input the limitations the KIC software will use to determine when to issue a Warning condition for the MD in the **Warning at Maximum Deviation Value** fields.
- Input the limitations the KIC software will use to determine when to issue an Alarm condition for the MD in the **Alarm at Maximum Deviation Value** fields.

VIRTUAL PROFILE BANDS GROUP SETUP

This group is only available for use if KICprobes are installed and a Virtual Profile has been created.



The Virtual Profile Bands, or templates, provide a means of visualizing a set of user defined limitations that envelope the Virtual Profile.

Note: You cannot activate the alarm based on the Virtual Profile Bands.

- To display the Virtual Profile Bands on the graph, select the **Display Good and Warning Templates for Virtual Product TCs** checkbox.
- To activate the alarm (software, KIC Alarm Relay, or PLC Cable) when the MD meets or exceeds the designated alarm value, select the **Alarm when KICprobe Data Maximum Deviation Reaches the Alarm Value** checkbox.
- Input the limitations the KIC software will use to define the exterior limit of the “good” area in the **Expand Good Template** fields.
- Input the limitations the KIC software will use to define the exterior limit of the “warning” area in the **Expand Warning Template** fields. The interior of the warning area is the exterior limit of the good area.

Setup for Function & Privilege Levels

The KIC software supports two different levels of software usage:

- **Function Levels** – The KIC software contains a rich set of tools, some of which are often only used by a few customers in a corner of the industry. Little used tools can now be hidden so the typical user doesn't have to wade through them to get to the more common commands. The Function Levels are pre-assigned and require no password protection.

  Note: The only exception to this is the Administrator function level. The Administrator function level will always require a password since this level is the key that unlocks the door to the Privilege Levels.

- **Privilege Levels** – The Privilege Levels are, by default, disabled when the KIC software is initially installed and cannot be used until someone with Administrator privileges enables the feature. It is the sole responsibility of the controlling person of the KIC system to decide whether or not the Privilege Levels will be used. All Privilege Levels are password protected by the Administrator.

Function Levels (no password required)

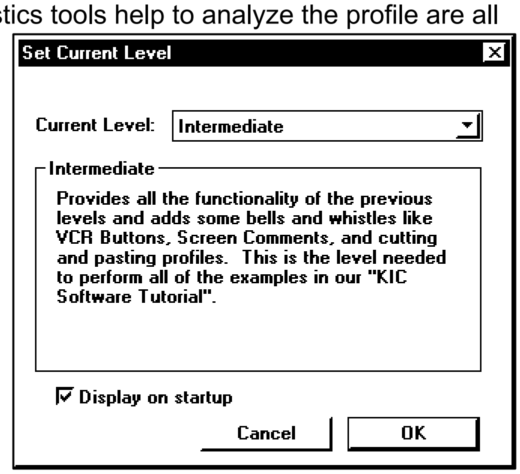
The KIC software has five **Function Levels** to help tailor the application to each customer:

- Limited
- Basic
- Intermediate
- Advanced
- Administrator (password always required)

To select a Function Level, select **Current Level** from the Setup list menu, or use ALT+S+C. The **Set Current Level** dialog box appears.

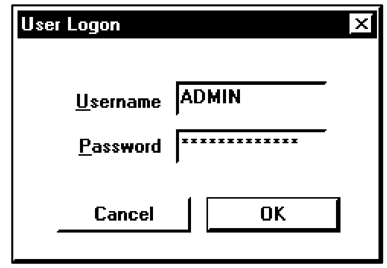
From the **Current Level** list menu, select the Function Level that best suits your needs.

- **Limited** – This function level provides all the tools necessary to perform a quick profile. The Zoom, Pointer, and Statistics tools help to analyze the profile are all easily accessibly in this level. This is an excellent choice for profiling batch ovens, rework stations, and other processes where the Profile Prediction and Virtual Profiling tools are not applicable.



- **Basic** – This level provides all the functionality found at the "Limited" level and includes Profile Prediction and Virtual Profiling. This is the default level for first time users (if this is the first time the KIC Software is being installed on this computer).
- **Intermediate** – This level provides all the functionality of the previous levels and adds some bells and whistles like

VCR Buttons, Screen Comments, and cutting and pasting profiles. This is the default level if a previous version of the KIC software has been installed on this computer. This is also the level that is necessary to perform all of the examples in our "KIC Software Tutorial".



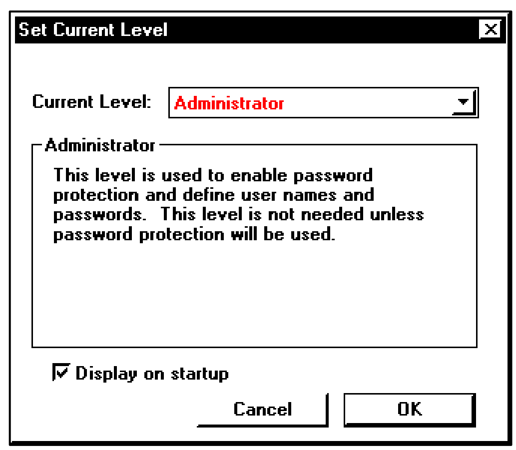
- **Advanced** – This level provides all the functionality of the previous levels and adds a plethora of specialized tools for unique applications. If you can't find the functionality you're looking for, switch to the "Advanced" level and look again.
- **Administrator** – This level is used to enable password protection and define user names and passwords. This level is not needed unless password protection will be used. If you select this level, the **User Logon** dialog box will appear.

  Only ADMIN requires the use of a password in the Function Levels because it provides the doorway to the Privilege Levels, which ultimately permit the assignment of users, passwords and privilege levels. The default administrator user name is ADMIN, the default password is KOB.

  Note: The password for the ADMIN level should be changed by the Administrator as soon as possible once the KIC software has been successfully been installed.

Privilege Levels (password required)

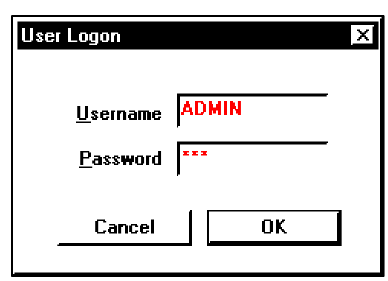
To use the Privilege Levels they must first be enabled by the Administrator before they can be used.

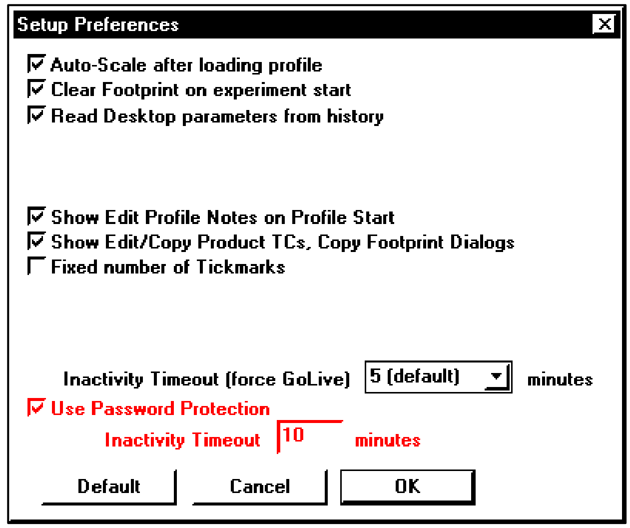


To enable the Privilege Levels, follow these steps:

- Start by selecting **Current Level** from the Setup list menu. The Current Level dialog box will appear.
- Choose **Administrator** from the **Current Level** list menu. The User Logon dialog box will appear. Anytime the Administrator level is chosen, a Username and Password are required.
- Input **ADMIN** for the **Username** and **KOB** (default) for the **Password**, then select the **OK** button.

  Note: The default password for the Administrator level is KOB when you received the KIC software. If you have changed this default password in the past, you should input your new password instead of KOB.



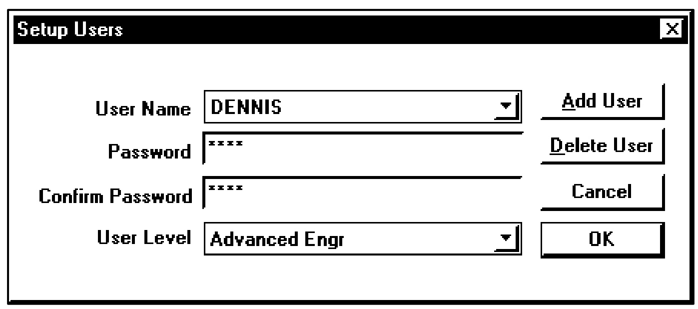


- Select Global Preferences from the **Setup** list menu (ALT+S+G). The **Global Preference** dialog box will appear.
- Select the Use Password Protection checkbox.
- Input an **Inactivity Timeout** limit (in minutes). This will force the KIC software down to the View Only level if inactivity with the KIC software exceeds this limit.

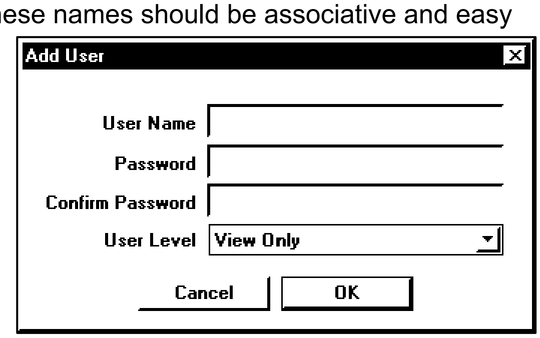
  Note: A value of 0 (zero) will disable the Inactivity Timeout feature. The maximum value that can be used is 546 minutes.
- Click on the OK button. The Privilege Levels are now enabled.

ASSIGNING THE PRIVILEGE LEVELS

Once the Privilege Levels have been enabled, the Administrator can of create individual users, groups of users, passwords and user levels.



- Logon as the Administrator.
- Select **Users** from the Setup list menu (ALT+S+E). The **Setup Users** dialog box will appear.
- To add a user, click on the **Add User** button from the **Setup Users** dialog box. The **Add User** dialog box will appear.
- Input the **User Name** – generally, these names should be associative and easy for the user to remember.



- Input the **Password**, then input the same password in the **Confirm Password** field. If these two entries are not exactly the same values, you will not be able to save this users setup.
- From the **User Level** list menu, select the Privileges the user may have access to.
  - ✓ **View Only** – This is the lowest level and allows the user to look at the current live screen and any historical data available in the Event Browser. However, they cannot Hide profiles, and they cannot change the Recipe, run a profile, or change the history in any way. This is useful if the user responsibilities are merely to watch for alarms and report them.

- ✓ **Operator (Load Recipes)** – This privilege level allows all of the privileges of the previous level and also allows recipes to be loaded. This is useful if the user responsibilities are simply to make sure that the correct Recipe is loaded in the KIC software and report any alarms.
- ✓ **Tech (Run Profiles)** – This privilege level allows all of the privileges of the previous level and also allows the user to run profiles. This is useful if the user responsibilities are to make sure the correct recipe is loaded, and to run a product profile to verify the process.
- ✓ **Sr. Tech** – This privilege level allows all of the privileges of the previous level and also allows the user to update the virtual profile in a recipe. This is useful if the user responsibilities are to run a profile whenever the Virtual Profile indicates an alarm. If the actual profile is within tolerance, the user can create a new Virtual Profile and update the recipe.
- ✓ **Engineer (Create Recipes)** – This privilege level allows the user to perform all of the functions that are necessary to setting up and maintaining the KIC Prophet Thermal Manager, SlimKIC, SlimKIC-II, or SideKIC Thermal Profilers, or Quick-KIC Thermal Recorder. At this level, all of the functions are available that are needed to perform all of the examples in our "KIC Software Tutorial".
- ✓ **Advanced Engr.** – This privilege level allows all of the functionality of the previous levels plus it adds a plethora of specialized tools for unique applications.
- ✓ **Administrator** – This privilege level is used to enable password protection and define user names and passwords. This level is not needed unless password protection will be used. The default administrator user name is "ADMIN", the default password is "KOB".

EDITING A PRIVILEGE LEVEL USER

- From the **User Name** list menu, select the user you wish to change.
- Make any changes to the **Password** and/or **User Level**, then select the OK button when finished.

DELETING A PRIVILEGE LEVEL USER

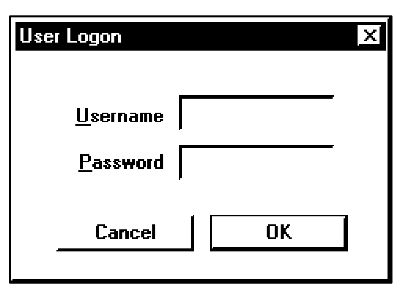
- Select the User Name to delete.

Click on the Delete User button, then click on OK when finished.

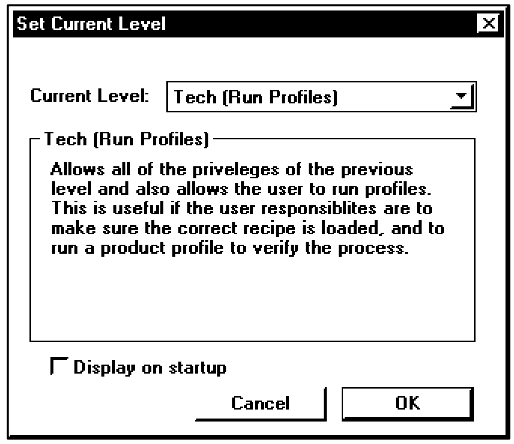
USING THE PRIVILEGE LEVELS (password required)

To access your assigned Privilege Level, select **Logon** from the File list menu, or use ALT+F+L. The **User Logon** dialog box will appear.

Input your assigned **Username** and **Password**, then click the OK button. This procedure is common throughout all Privilege Levels, including the Administrator level.



If your Privilege Level assignment is anything higher than View Only, you may, at your discretion, choose to select a lower Privilege Level. This will allow you to minimize tools and options that you simply don't want displayed at the time, in much the same fashion as the Function Levels do.



To select a lower Privilege Level, select **Current Level** from the Setup list menu, or use ALT+S+C. The **Set Current Level** dialog box will appear.

Select a Privilege Level from the **Current Level** list menu, then click OK.

Note: Use this same procedure to return to your original Privilege Level.

- To prevent others from accessing you Privilege Level, select **Logoff** from the File list menu (ALT+F+L) to bring the KIC software down to the View Only mode.

  Note: Remember, no matter which Privileges are selected, the user be able to, at their option, temporarily reselect a lower Privilege level than that assigned through the Current Level dialog box.

- Click on the **OK** button. This user assignment is now available.

  Note: It's a good practice to first test new user assignments to ensure that you've provided access to those tools needed to accomplish their tasks.

PROFILING METHODS

There are four basic methods that can be used when performing a profile using KIC systems. The method that's best for you depends upon the application that you will be profiling and it's proximity to the computer running the KIC software.

The following list are the standard methodologies used to perform profiles:

- **Radio Frequency (RF) Method** (most common) – This is the most common method and employs the use of the SlimKIC, SlimKIC-II or SideKIC Thermal Profiler's transmitter to relay the data via radio frequency to a Thermal Recorder connected either to a TPU or computer COM port.

  This method provides live streaming temperature data to the KIC software and can support Continuous Profiling.

- **Trailing Wire Method** – This method is used when a SlimKIC, SlimKIC-II, or SideKIC Thermal Profiler is either not available or they may be inappropriate due to elevated temperatures within the process. A Thermocouple Extension cable is attached to a Thermocouple Processing Unit (TPU), KICboard or Quick-KIC Thermal Recorder.

  This method provides live streaming temperature data to the KIC software and can support Continuous Profiling.

- **Direct Connect Method** – This method is generally used for bench-top applications and requires that the computer be in close proximity to the application under testing. A Direct Connect cable provides a communication link between the SlimKIC or SlimKIC-II Thermal Profilers. The SideKIC Thermal Profiler has no facility to support this method.

  This method provides live streaming temperature data to the KIC software and can support Continuous Profiling.

- **Data Logging Method** – This method employs the use of the onboard memory of the SlimKIC or SlimKIC-II Thermal Profilers and is an optional feature on both of these units. The temperature data is available to the KIC software only after the profile is finished and the data is downloaded to the computer via the Direct Connect cable.

  This method <u>does not</u> provide live streaming temperature data to the KIC software and does not support Continuous Profiling.

Also included at the end of these procedures is a setup for using the Continuous Profiling method for those performing repeated experiments.

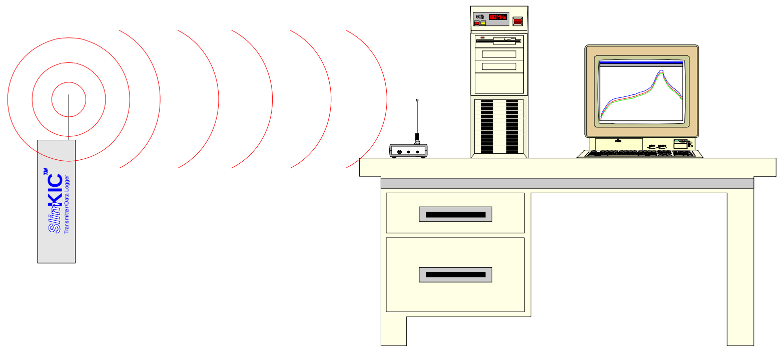
One piece of hardware that has an impact on the way that profiles were performed in the past is the ***Board Sensor*** system. When implemented, the Board Sensor at the oven's entrance is actually used to tell the KIC software "when" to start the profile.

This method ensures repeatability in all the profile starts. Manual Belt Speed checks are no longer necessary since the oven's exit Board Sensor automatically measures this variable.

The Start buttons and the Belt Speed check buttons on the TPU or the Thermal Receivers <u>are not used</u> when a Board Sensor system is installed.

Radio Frequency (RF) Method

The SlimKIC, SlimKIC-II and SideKIC Thermal Profilers are basically telemetry based data acquisition units that automatic measurement and transmission of data by radio from remote sources to a receiving station for recording and analysis.



This method is only accomplished through the use of a SlimKIC, SlimKIC-II, or SideKIC Thermal Profiler and involves broadcasting live data from the transmitter (Thermal Profiler) directly to a radio receiver (Thermal Receiver) that's connected by some means to the computer COM port.

Note: If your SlimKIC or SlimKIC-II Thermal Profiler is only configured with the Data Logger option and you would like more information about upgrading it with the Transmitter option, contact KIC Thermal Profiling's Sales Department.

The Thermal Receiver (the unit that "listens" to the transmitting signal) can be attached to the computer in two different fashions:

- Connected directly to the computer COM port
- Connected to the computer COM port via the TPU

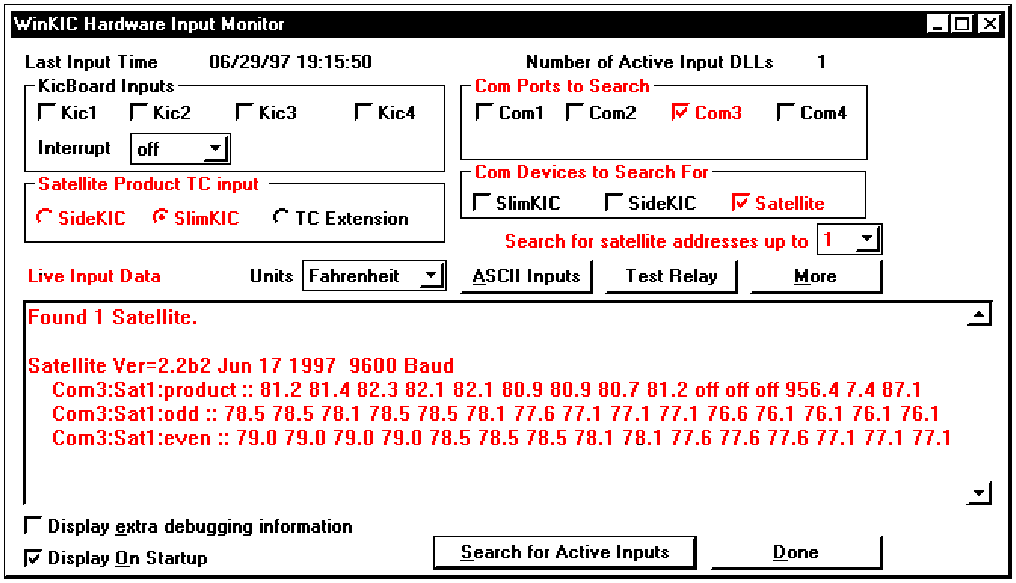
The SlimKIC, SlimKIC-II and SideKIC Thermal Profilers are very specialized data acquisition units. All three units are specifically designed to withstand internal temperatures of up to 100ºC indefinitely, the highest of any temperature profiler ever designed. These units are built to endure the punishing environments they are typically exposed to but still maintain the temperature data integrity of the unit under testing.

This method provides live streaming temperature data to the KIC software and can support Continuous Profiling.

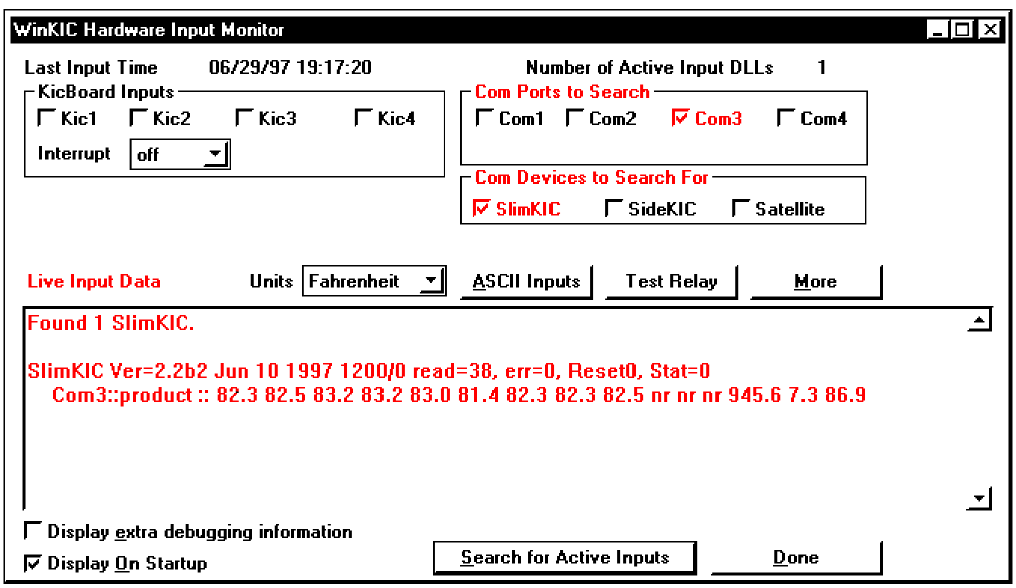
SETUP

- Connect the product thermocouples to the female SMP connectors on your Thermal Profiler.
- Ensure that a 9 volt battery is installed inside the Thermal Profiler.
- Turn ON the Profiler. It should emit an audible beeping sound.
- Start the KIC software.
- Ensure that the Hardware Input Monitor is correctly setup to communicate with the Thermal Profiler in use:

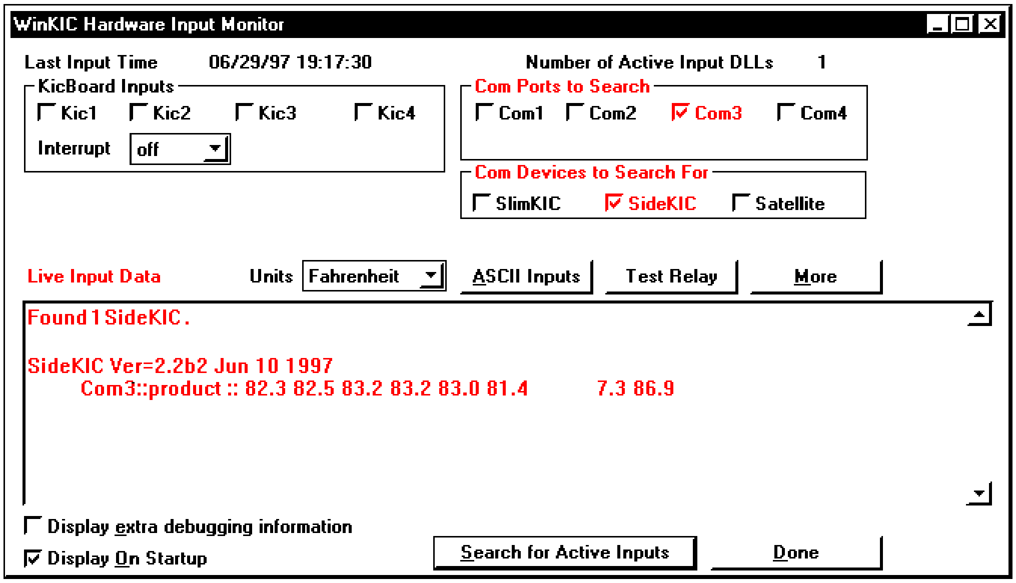
  Note: If you have two or more Thermal Profilers in you facility you should check that the Thermal Profiler and Thermal Receiver have compatible frequencies.



The Thermal Receiver is connect through a TPU (Satellite) and is expecting the temperature data to be transmitted from a SlimKIC Thermal Profiler. If you are using a SideKIC Thermal Profiler, select it in lieu of the SlimKIC in the **Satellite Product TC Input** box.



The Thermal Receiver is connect directly to a computer COM port and is expecting the temperature data to be transmitted from a SlimKIC Thermal Profiler.

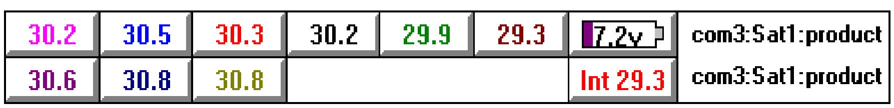


The Thermal Receiver is connect directly to a computer COM port and is expecting the temperature data to be transmitted from a SideKIC Thermal Profiler.

- Verify that the battery voltage is above 7.0 volts.

  Note: Below 7.0 volts the signal being transmitted from the Thermal Profiler may not be strong enough to be received by the Thermal Receiver. A normal phenomenon associated with battery voltage is that it will lower as the battery is heated. With this in mind, it is recommended that you start with a battery voltage of at least 7.5 volts.

- Once the hardware setup is verified, select the **Done** button.
- Open the oven file that you will use to profile.
- Observe the TC Button bar to ensure that they are being updated, indicating that live temperature data is being received.



Note: If the TC Button bar is not visible for this oven, select TC Buttons from the View list menu or press ALT+V+B.

- By default, the maximum number of data points that the KIC system will collect is 2,000 per thermocouple used. For almost all cases, this is the best value to use. If you will be using this value, the setup is complete.

  If you deem it necessary to decrease or increase the maximum number of data points that each Product Thermocouple can collect, follow these steps:

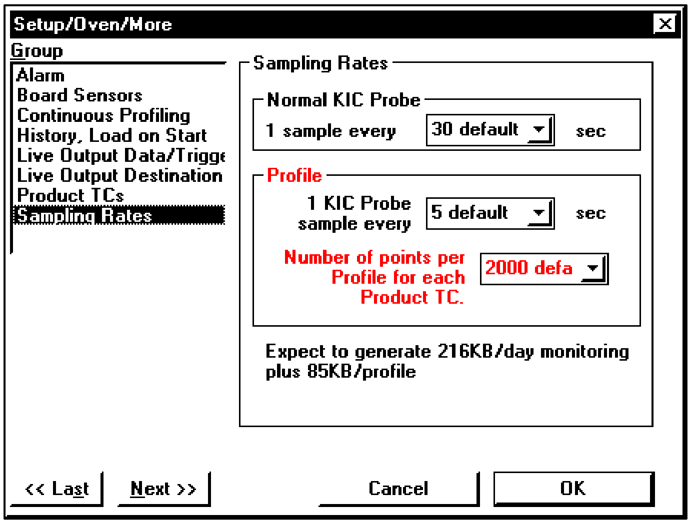
  ✓ Select **Oven** from the **Setup** list menu, press ALT+S+O, or click on the  icon from the Toolbar. The **Setup Oven** dialog box will appear.

  ✓ Select the **More** button. The **Setup/Oven/More** dialog box will appear.

  ✓ Select the **Sampling Rates** group.

  ✓ From the Number of Points per Profile for Each Product TC list menu, select the maximum number you will use.

CAUTION: You should standardize on whichever value you select. Comparing the statistics of two "like" profiles where one has 500 data points and the other has 2000 data points will yield different results.



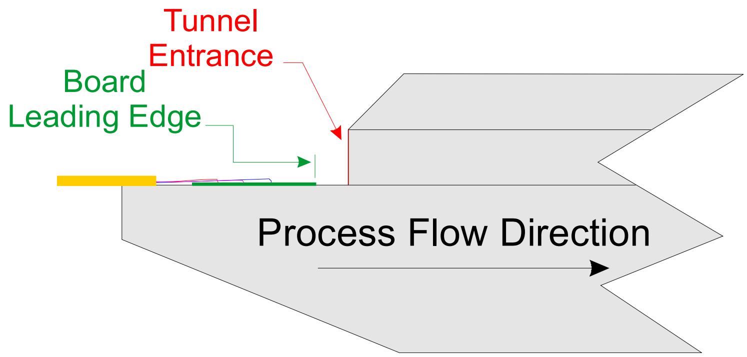
✓ Click on the **OK** button.

✓ Click on the **Save** button in the **Setup Oven** dialog box. The new setting is now saved with the oven setup.

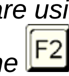
✓ Click on the **Done** button to return to the KIC software's main screen.

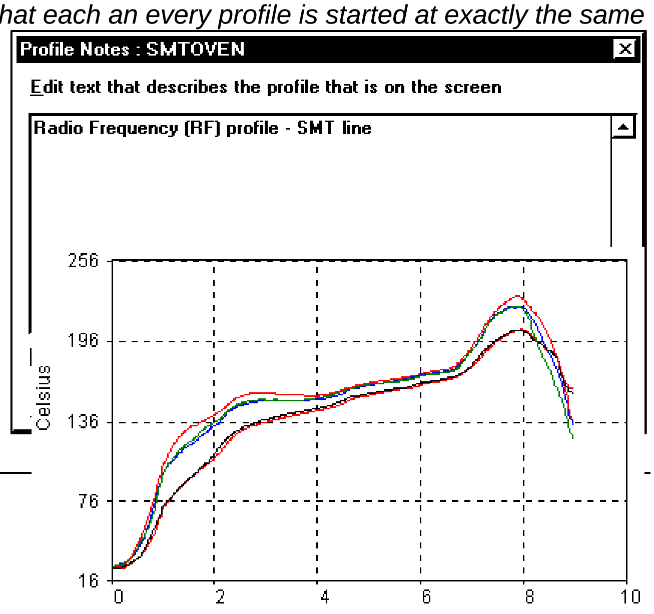
PROFILING

- Ensure that the Thermal Profiler is ON and that the product thermocouples are attached.
- Place the Thermal Profiler inside the Thermal Shield and close the cover.
- If you are profiling a conveyorized oven, start the profile when the leading edge of the board reaches the oven entrance.



- Start the profile using one of the following methods:
  - ✓ Pressing the  button on the computer keyboard (most common).
    OR
  - ✓ Clicking the  icon from the Toolbar.
    OR
  - ✓ Pressing or toggling the **START** button on Thermal Receiver. This start method is only available when a Board Sensor system is not installed. (see note below)
  - ✓ Pressing the **START** button on the face of the TPU interface panel. This start method is only available when using a TPU but should never be used if you are using a Board Sensor system for your process (see note below).

    Note: If you are using a Board Sensor system, the profile should be started by pressing the  *key or clicking on the*  *icon from the toolbar. The KIC software will "arm" the oven entrance Board Sensor for the profile start. When the board passes the sensor, the profile will be started automatically. This method ensures that each an every profile is started at exactly the same point on the oven, every time you run a profile.*

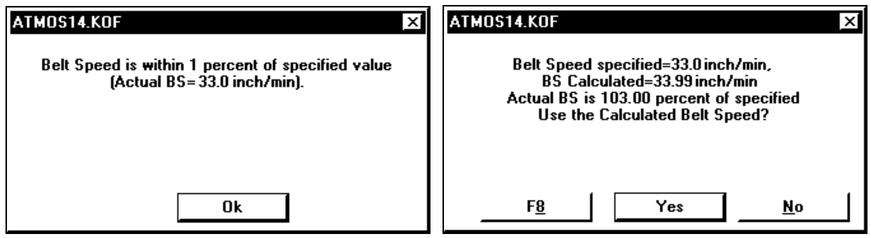
    The profile is now started and the **Profile Notes** dialog box will appear.
- Input any applicable notes in the space provided and click on the **OK** button.
- Observe the progress of

the profile on the KIC software.

Note: Initially, you may need to experiment in order to find the optimum location for the Thermal Receiver. Do this by observing the LCD meter on the face of the Thermal Receiver to determine if you are experience a loss or degradation of signal.

Experience has show that a centered position on the top of the oven yields the best reception in most cases.

When the leading edge of the product meets the oven exit, a Belt Speed check can be performed by either manually pressing the Belt Speed check switch or pressing the F8 *key.*



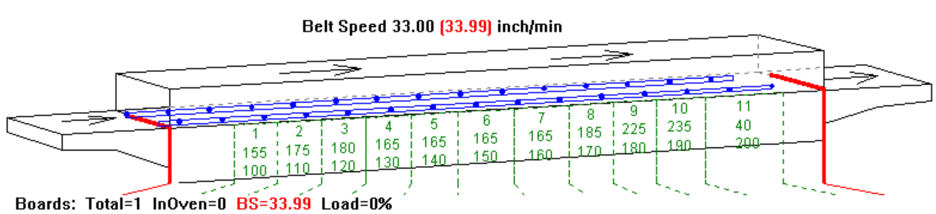
If the measured belt speed differential is greater than 1%, you should check the following:

- ✓ The profile was either started or ended too soon or too late.
- ✓ Your product had moved on the conveyor after loading. Product boards with trailing wire TC's attached are prone to this problem. *TIP: Many of our customers attach small hardware, such as clips or screws, on their product to maintain a stationary position on the conveyor. You should ensure that the thermal mass of this hardware will not significantly affect your thermal profile.*
- ✓ The KIC_{Start}, KIC_{End}, or tunnel length positions were not correctly measured in the **Oven Measurement** section, or incorrectly defined in the **Setup Oven** dialog box.
- ✓ Your conveyor belt speed is actually out of calibration. Consult your oven's maintenance manual.

  Note: *This can only be determined after you've checked all the other possibilities above.*

- If a Board Sensor system has been implemented, the Belt Speed measurement is completely automated and requires no further interaction by the user.

  The KIC software accomplishes this task by measuring the time it takes for the board to pass between the oven's entrance sensor to the oven's exit sensor, then compares this measured value to the target value that was input in the **Setup/Recipe/Setpoints/Beltspeed** dialog box. This method ensures belt speed measurement repeatability by using the same fixed start and end points.



After the profile board has passed the Board Sensor at the oven's exit, the measured Belt Speed (BS) will be displayed above the oven diagram (if selected for display) next to the BS target as set in the recipe.

Additionally, the measured Belt Speed (BS) will appear within the Board Sensor information line just below and left of the oven diagram.

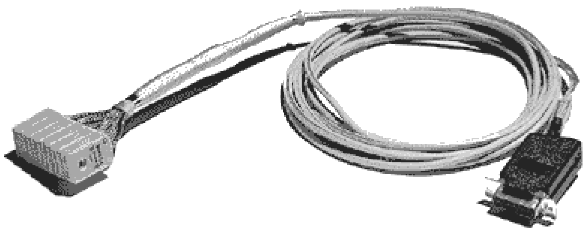
- Remove the Profiler from it's Thermal Shield, then remove the Thermal Profiler's cover to help accelerate it's cooling.

Note: Even after the Thermal Profiler has exited the oven, heat is still be transferred to the inside of the Profiler. To help extend the life of your unit, you should ensure that it's internal temperature never gets any higher than that necessary to perform the profile.

One way of monitoring the Thermal Profiler's cooling is to leave it ON, even after the profile is completed, to observe it's internal temperature on the TC Button bar of the KIC software.

- Use the Analysis Tools provided in the KIC software to examine your profile.

Trailing Wire Method



This method is typically used when a SlimKIC, SlimKIC-II, or SideKIC Thermal Profiler is either not available or they may be inappropriate due to elevated temperatures within the process.

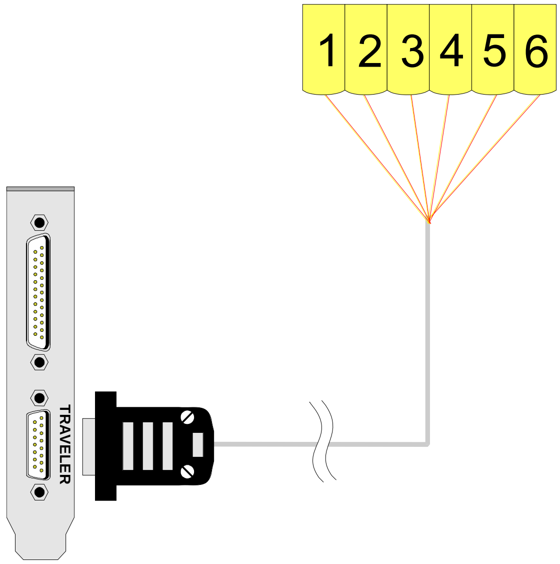
This method provides live streaming temperature data to the KIC software and can support Continuous Profiling.

The Thermocouple Extension cable is a device that attaches to a connector labeled “Traveler” on the Thermocouple Processing Unit (TPU), KICboard or Quick-KIC Thermal Recorder, and can facilitate a maximum of 6 thermocouples.

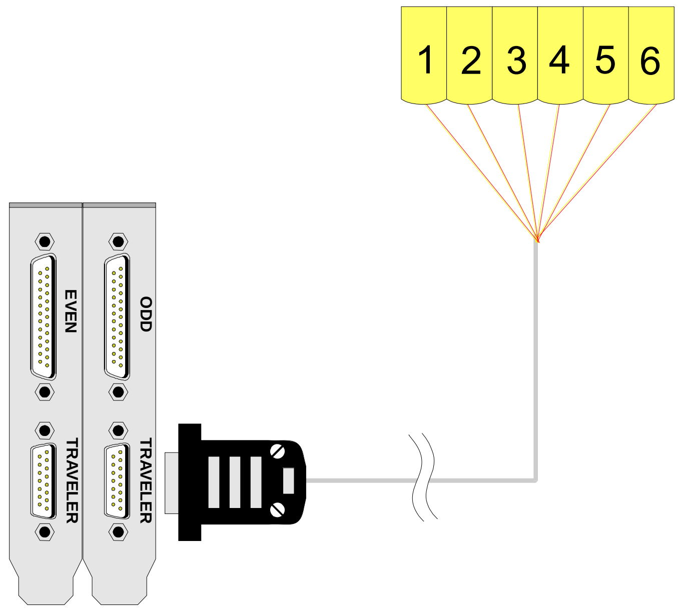
Note: It’s possible to use a maximum of 12 thermocouples when two or more KICboards or Quick-KIC Thermal Recorder cards are installed.

SETUP

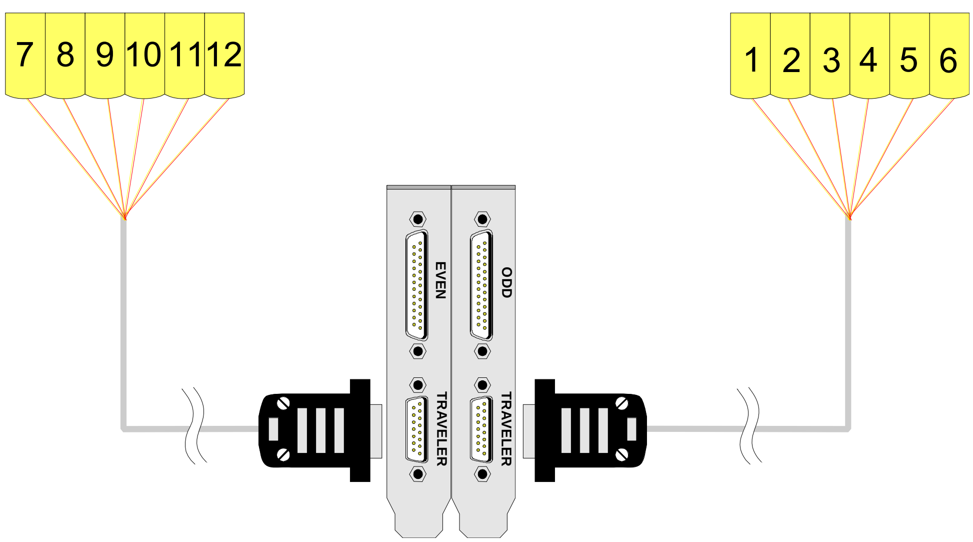
- Connect the Thermocouple Extension cable to the KIC system:
  - ✓ When using a Quick-KIC Thermal Recorder card, connect the DB-15 connector of the Thermocouple Extension cable to the Traveler connector on the back of the computer.



✓ When using KICboards where a single Thermocouple Extension cable will be used, connect the DB-15 connector of the Thermocouple Extension cable to the Traveler connector of the ODD KICboard on the back of the computer.

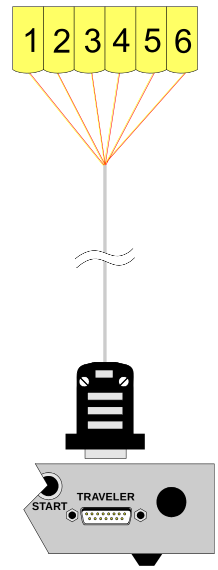


✓ When using KICboards where two Thermocouple Extension cables will be used, connect the DB-15 connectors of the Thermocouple Extension cable to the Traveler connectors of the KICboards on the back of the computer.

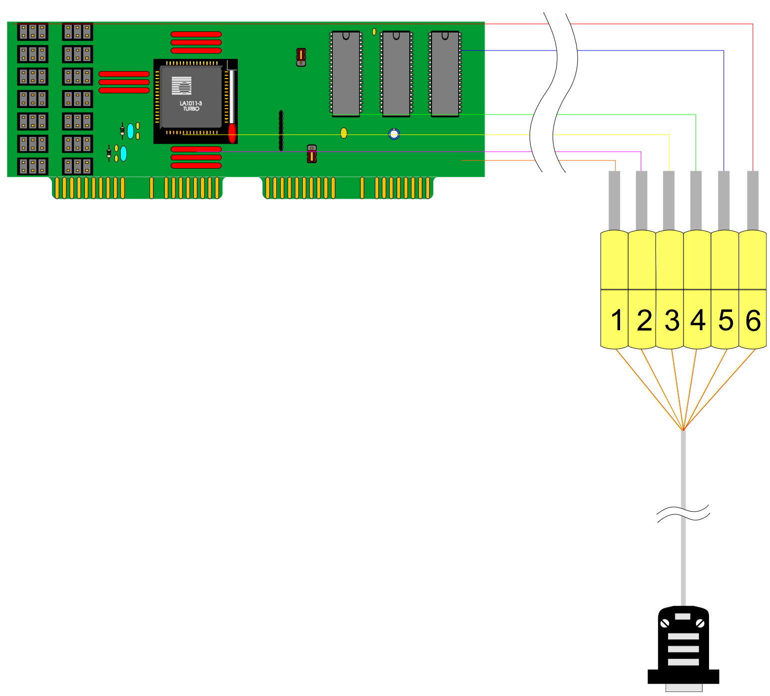


Note: The ODD KICboard will receive product thermocouples 1 through 6, and the EVEN KICboard will receive product thermocouples 7 through 12.

✓ When using a Thermocouple Processing Unit (TPU), connect the DB-15 connector of the Thermocouple Extension cable to the Traveler connector of the TPU.

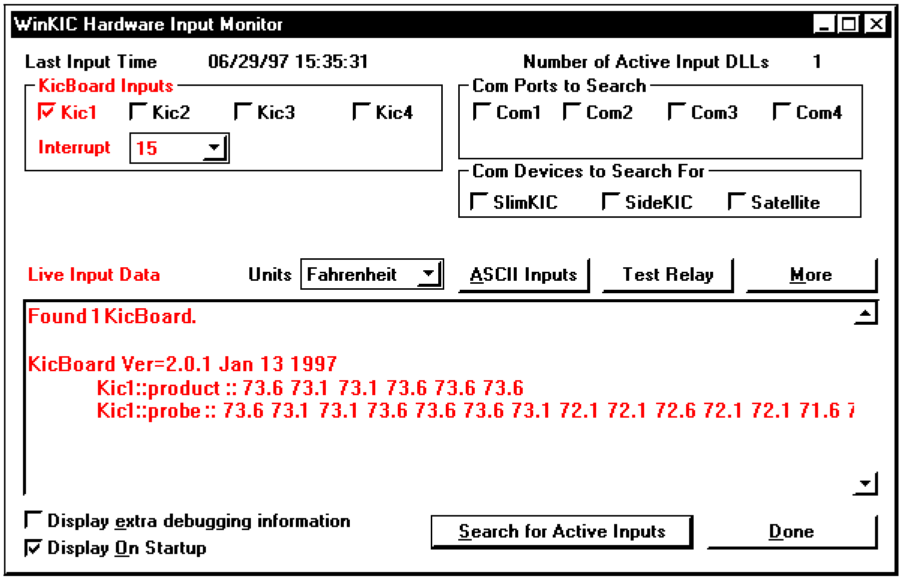


- Connect the product thermocouples into the SMP female connectors at the other end of the Thermocouple Extension cable.

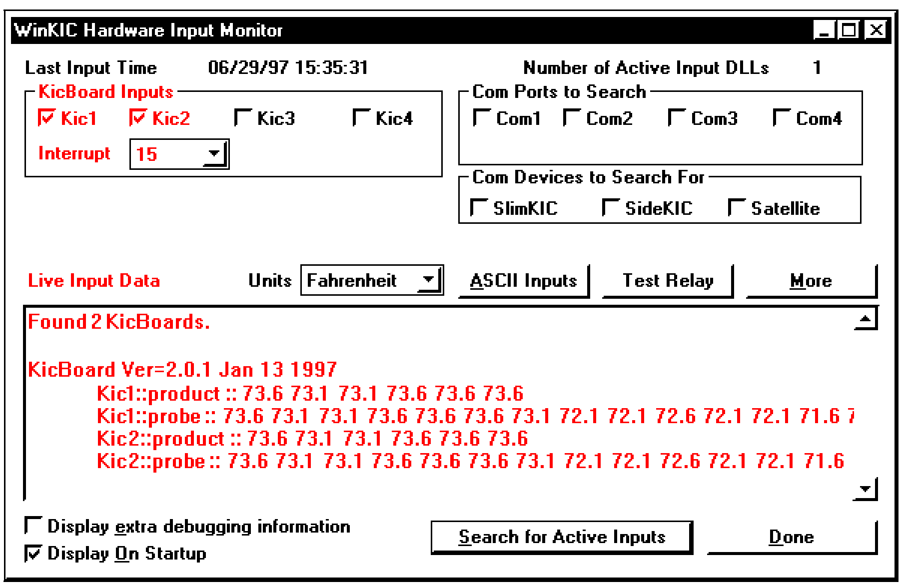


- Start the KIC software and access the Hardware Input Monitor by choosing Hardware from the Setup list menu or pressing ALT+S+H.

- Ensure that the Hardware Input Monitor is correctly setup to communicate with the hardware in use:

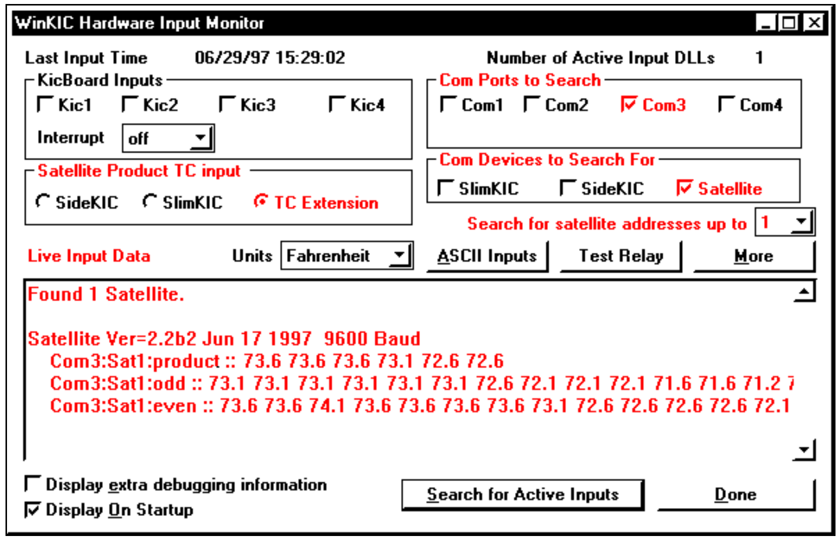


Hardware Input Monitor setup for a Quick-KIC Thermal Recorder card.



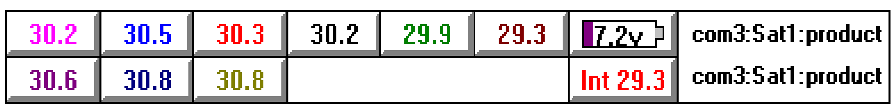
Hardware Input Monitor setup for a pair of KICboards.

*Note: If you have previously been using a Thermal Receiver connected to a COM port to receive temperature data from a SlimKIC, SlimKIC-II or SideKIC Thermal Profiler, you may need to redirect the product temperature data input default in the **Setup/Oven/More/Product TCs** dialog box to the KICboard product input (Traveler connector).*



Hardware Input Monitor setup for a Thermocouple Processing Unit (TPU) with the **Satellite Product TC Input** set to expect incoming temperature data from the **TC Extension** cable.

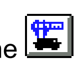
- Once the hardware setup is verified, select the **Done** button.
- Open the oven file that you will use to profile.
- Observe the TC Button bar to ensure that they are being updated, indicating that live temperature data is being received.



Note: If the TC Button bar is not visible for this oven, select TC Buttons from the View list menu or press ALT+V+B.

- By default, the maximum number of data points that the KIC system will collect is 2,000 per thermocouple used. For almost all cases, this is the best value to use. If you will be using this value, the setup is complete.

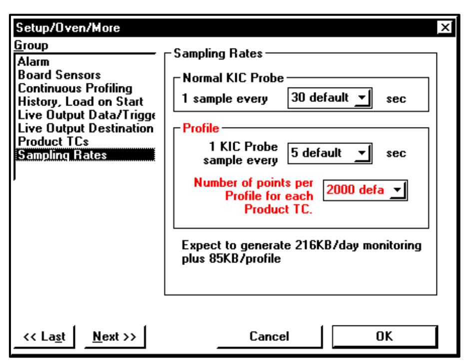
  If you deem it necessary to decrease or increase the maximum number of data points that each Product Thermocouple can collect, follow these steps:

  ✓ Select **Oven** from the **Setup** list menu, press ALT+S+O, or click on the  icon from the Toolbar. The **Setup Oven** dialog box will appear.

  ✓ Select the **More** button. The **Setup/Oven/More** dialog box will appear.

  ✓ Select the **Sampling Rates** group.

  ✓ From the Number of Points per Profile for Each Product TC list menu, select the maximum number you will use.



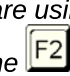
CAUTION: You should standardize on whichever value you select. Comparing the statistics of two "like" profiles where one has 500 data points and the other

has 2000 data points will yield different results.

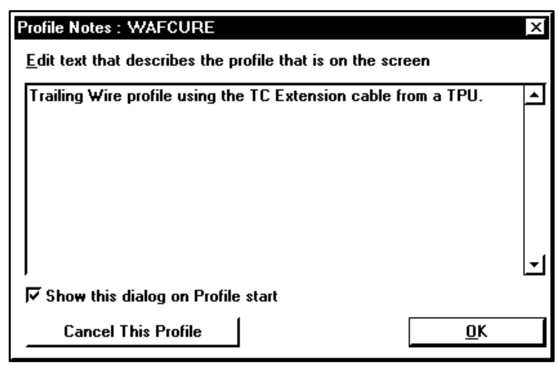
- ✓ Click on the **OK** button.
- ✓ Click on the **Save** button in the **Setup Oven** dialog box. The new setting is now saved with the oven setup.
- ✓ Click on the **Done** button to return to the KIC software's main screen.

PROFILING

- If you are profiling a conveyorized oven, start the profile when the leading edge of the board reaches the oven entrance.
- Start the profile using one of the following methods:
  - ✓ Pressing the  button on the computer keyboard (most common).
    OR
  - ✓ Clicking the  icon from the Toolbar.
    OR
  - ✓ Pressing the **START** button on the face of the TPU interface panel. This start method is only available when using a TPU but should never be used if you are using a Board Sensor system for your process (see note below).

    Note: If you are using a Board Sensor system, the profile should be started by pressing the  *key or clicking on the*  *icon from the toolbar. The KIC software will "arm" the oven entrance Board Sensor for the profile start. When the board passes the sensor, the profile will be started automatically. This method ensures that each an every profile is started at exactly the same point on the oven, every time you run a profile.*

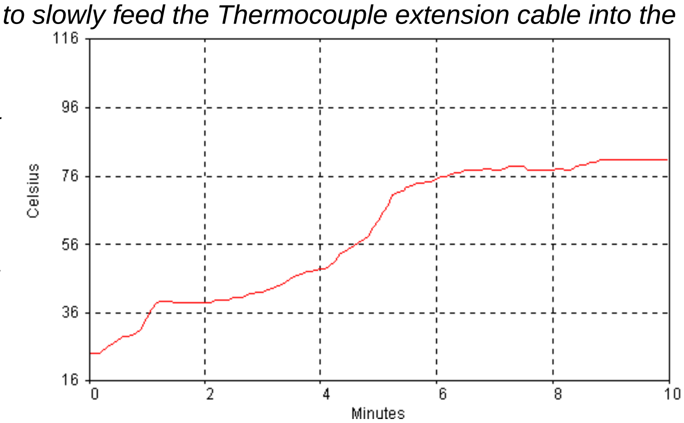
    The profile is now started and the **Profile Notes** dialog box will appear.



- Input any applicable notes in the space provided and click on the **OK** button.
- Observe the progress of the profile on the KIC software.

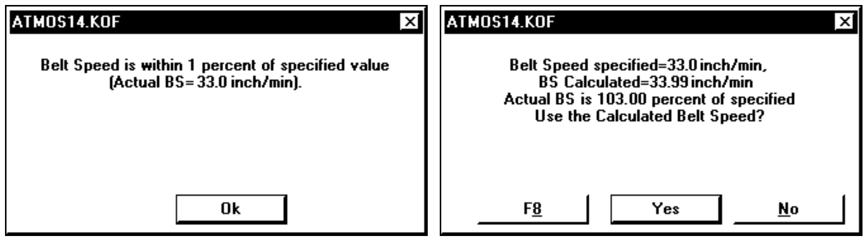
  Note: If profiling a conveyorized oven using the Trailing Wire method, it will be necessary for someone to slowly feed the Thermocouple extension cable into the oven entrance during the profile.

  It is extremely important to ensure that the Thermocouple Extension does not tug at the product during the profile. An incorrect belt speed will result if the product is moved relative to the conveyor movement.



The SMP connector end of the Thermocouple Extension cable may require some form of support if a rail conveyor is used without a mesh conveyor underneath. In this case, a dummy board may be used to support the Thermocouple Extension cable end by using Kapton tape to secure the cable to the board.

When the leading edge of the product meets the oven exit, a Belt Speed check can be performed by either manually pressing the Belt Speed check switch or pressing the F8 *key.*



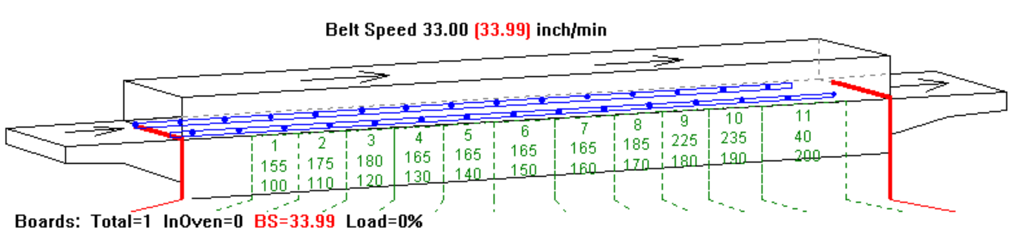
If the measured belt speed differential is greater than 1%, you should check the following:

- ✓ The profile was either started or ended too soon or too late.
- ✓ Your product had moved on the conveyor after loading. Product boards with trailing wire TC's attached are prone to this problem. *TIP: Many of our customers attach small hardware, such as clips or screws, on their product to maintain a stationary position on the conveyor. You should ensure that the thermal mass of this hardware will not significantly affect your thermal profile.*
- ✓ The KIC_{Start}, KIC_{End}, or tunnel length positions were not correctly measured in the **Oven Measurement** section, or incorrectly defined in the **Setup Oven** dialog box.
- ✓ Your conveyor belt speed is actually out of calibration. Consult your oven's maintenance manual.

  Note: *This can only be determined after you've checked all the other possibilities above.*

- If a Board Sensor system has been implemented, the Belt Speed measurement is completely automated and requires no further interaction by the user.

  The KIC software accomplishes this task by measuring the time it takes for the board to pass between the oven's entrance sensor to the oven's exit sensor, then compares this measured value to the target value that was input in the **Setup/Recipe/Setpoints/Beltspeed** dialog box. This method ensures belt speed measurement repeatability by using the same fixed start and end points.



After the profile board has passed the Board Sensor at the oven's exit, the measured Belt Speed (BS) will be displayed above the oven diagram (if selected for display) next to the BS target as set in the recipe.

Additionally, the measured Belt Speed (BS) will appear within the Board Sensor information line just below and left of the oven diagram.

- When the Thermocouple Extension cable runs out of slack, disconnect the DB-15 connector from the KIC system and slowly pull it through from the oven exit until clear.
- Use the Analysis Tools provided in the KIC software to examine your profile.

Direct Connect Cable Profiling Method

This method is typically used when perform bench-top profiles for such things as research and development. When the SlimKIC Thermal Profiler is employed using this method, live streaming temperature data will be passed directly from the SlimKIC Thermal Profiler to the computer via one of the computer's serial (COM) ports.

Only the SlimKIC and SlimKIC-II Thermal Profilers are capable of facilitating a Direct Connection setup. The SideKIC Thermal Profiler has no external ports with which to attach it directly to the computer.

Note: If you are currently using a SideKIC Thermal Profiler and would like to explore the use of a Direct Connect to the computer, contact KIC Thermal Profiling's Sales Department for more information.

A direct-connect cable was provided with your SlimKIC unit. This cable has a standard 9-pin RS-232 connector at one end which is used to plug into a RS-232 COM 1, 2, 3, 4, 5, 6, 7, or 8 port of your PC, and a standard male mini-DIN connector at the other which is used to plug into the female mini-DIN connector on the end of the SlimKIC.

With the SlimKIC connected directly to your computer, you can:

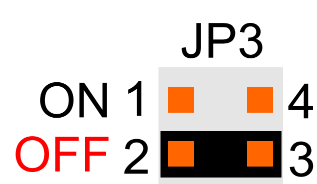
- Change the SlimKIC Thermal Profiler's internal setup. A direct connection is the <u>only</u> way to change the SlimKIC Thermal Profiler's settings.
- Collect temperature data in real-time, without the use of the SlimKIC transmitter or receiver. In this mode, the SlimKIC can also store temperature data in it's on-board RAM. Additionally, the SlimKIC can have it's transmitter disabled by moving the JP3 jumper from the ON position, to the OFF position.

  This will enable you to operate a second SlimKIC in real-time (RF mode) in close proximity to another data logging SlimKIC Thermal Profiler that uses the same radio frequency without RF signal conflicts.

SETUP

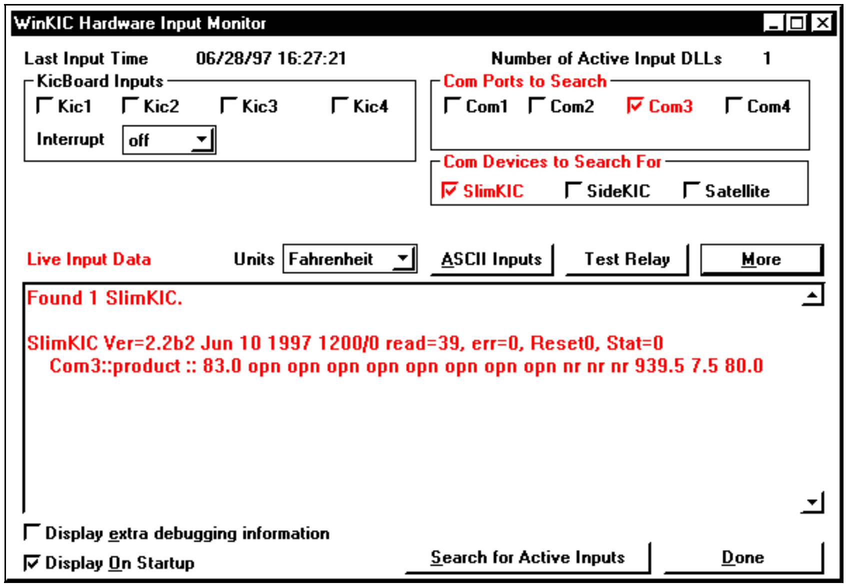
- With power off the SlimKIC Thermal Profiler, remove the cover.
- Move the jumper JP3 from the ON position to the OFF position.

  Note: Since the radio transmitter of the SlimKIC Thermal Profiler will not be used, it should be disabled to alleviate the RF signal when not used.



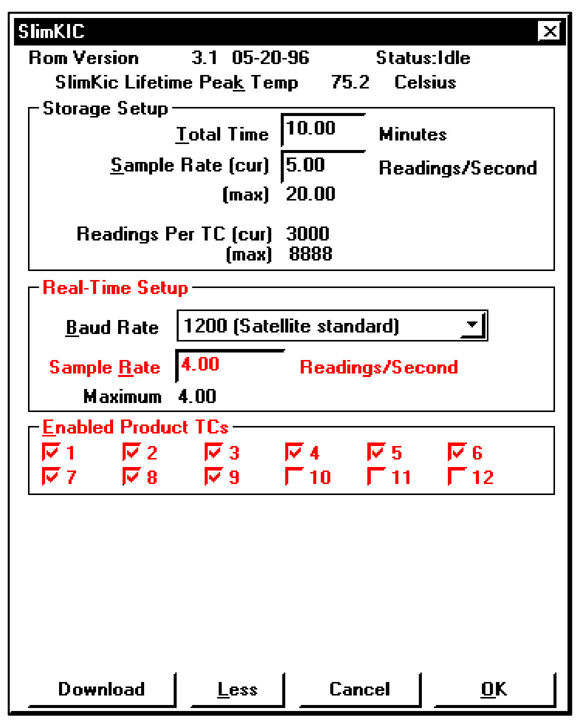
  JP3 provides a hardware means of enabling or disabling the transmitter function of the SlimKIC Thermal Profiler. With pins 2 & 3 jumped (closed) the transmitter function is OFF, or disabled.

- Connect the SlimKIC Thermal Profiler to the computer using the Direct Connect cable, then switch the unit on.
- Start the KIC software and go into the **Hardware Input Monitor**, which is accessible from the Setup list menu or pressing ALT+S+H.



- ✓ In the **COM Ports to Search box**, select the checkbox for the COM port the SlimKIC Thermal Profiler Direct Connect cable is attached to.
- ✓ In the **COM Devices to Search For** box, select the SlimKIC checkbox.
- ✓ In the **Live Input Data** box, ensure that the SlimKIC Thermal Profiler was found and that the data is being updated.
- ✓ Ensure that 9 volt alkaline battery in the SlimKIC Thermal Profiler has an adequate charge to profile.

  Note: If the charge is close to 7.0 volts, you replace the battery with another standard 9 volt alkaline battery.
- ✓ Exit the **Hardware Input Monitor**.



- Select **SlimKIC** from the **Setup** list menu or press ALT+S+S. The **SlimKIC Setup** dialog box in will appear.
- Input the sample rate to be used in the **Sample Rate** field of the Real-Time Setup box.

  Note: Although you won't be using the radio transmitter feature of the SlimKIC Thermal Profiler, you will still be receiving "live" data via the Direct Connect cable at the same rate as a "live" radio transmission.
- Select or deselect the Product TCs that you'll be using in the **Enabled Product TC's** box.

  Note: Deselecting thermocouples that will not be used during the profile can help increase the maximum readings

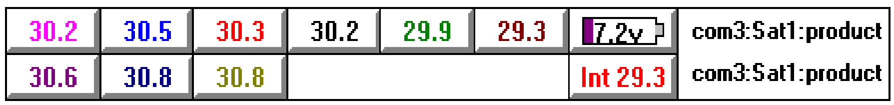
per second for the remaining thermocouples that you will use. However, you cannot deselect TC1.

- Click on the **OK** button to write the changes to the SlimKIC Thermal Profiler memory.

PROFILING

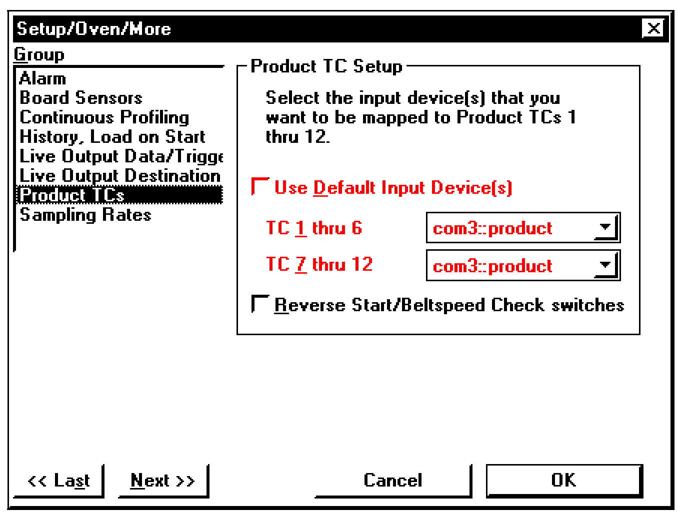
- Attach the thermocouples to the SlimKIC Thermal Profiler.
- Open the oven file that you will use to profile, ensuring that it's oven setup is correctly configured to read temperature data from the COM port that the SlimKIC Thermal Profiler is currently attached to.

Observe the TC Button bar to ensure that they are being updated, indicating that live temperature data is being received.



Note: If the TC Button bar is not visible for this oven, select TC Buttons from the View list menu or press ALT+V+B.

If this oven is not configured for the correct COM port, go into the **Setup/Oven/More/Product TCs** dialog box and manually change it to the correct port.

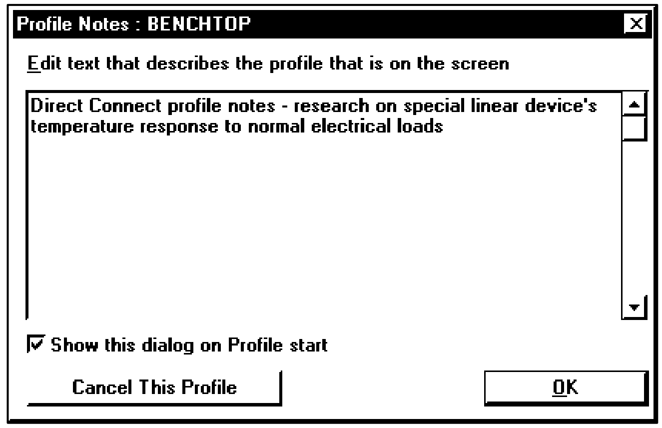


✓ Deselect the **Use Default Input Device(s)** checkbox. Two list menus will appear allowing you to manually select which COM ports the temperature data should be coming from.

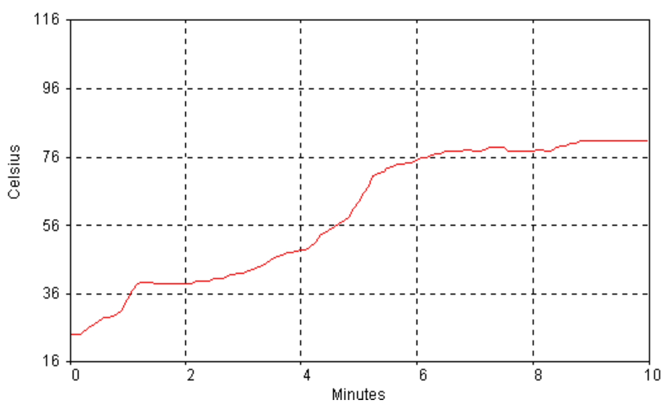
✓ Select the data sources for **TC 1 Thru 6**, and **TC 7 Thru 12**.

✓ Select the **OK** button, then select the **Save** button on the **Setup Oven** dialog box.

✓ Select the **Done** button to exit back to the main screen.

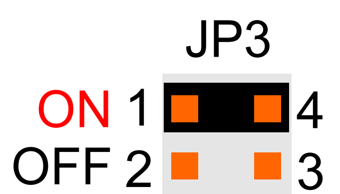


- Start the profile by pressing the  button on the computer keyboard or clicking the  icon on the Toolbar. The profile is now started and the **Profile Notes** dialog box will appear.
- Input any applicable notes in the space provided and click on the OK button.
- Observe the progress of the profile.
- When your finished profiling, remove power from the SlimKIC and remove it's cover.
- Replace the jumper JP3 from the OFF position, back to the ON position.



Note: This will ensure that when you're ready to use the SlimKIC Thermal Profiler again for a live profile via radio transmission, the jumper is in the correct position. JP3 provides a hardware means of enabling or disabling the transmitter function of the SlimKIC Thermal Profiler. With pins 1 & 4 jumped (closed) the transmitter is ON, or enabled.

- Use the Analysis Tools provided in the KIC software to examine your profile.



Data Logging Profile Method

Data logging is a very common method of collecting data, saving it to onboard memory, then downloading it for further data analysis at a later time.

Only the SlimKIC and SlimKIC-II Thermal Profilers are capable of performing Data Logging. The SideKIC Thermal Profiler has no onboard memory to facilitate the collection of data.

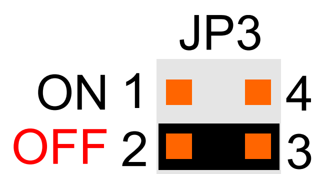
Note: If you are currently using a SideKIC Thermal Profiler and would like to explore the use of Data Logging, contact KIC Thermal Profiling's Sales Department for more information.

The SlimKIC and SlimKIC-II Thermal Profiler's are capable of collecting upwards of 60,000 data points in their memory. Before using the SlimKIC Thermal Profiler for Data Logging tasks, it should be properly setup to perform the work.

SETUP

To properly setup the SlimKIC Thermal Profiler for Data Logging tasks, the SlimKIC will be attached to a computer COM via the Direct Connect to either verify or adjust the **Storage Setup** in the **SlimKIC Setup** dialog box.

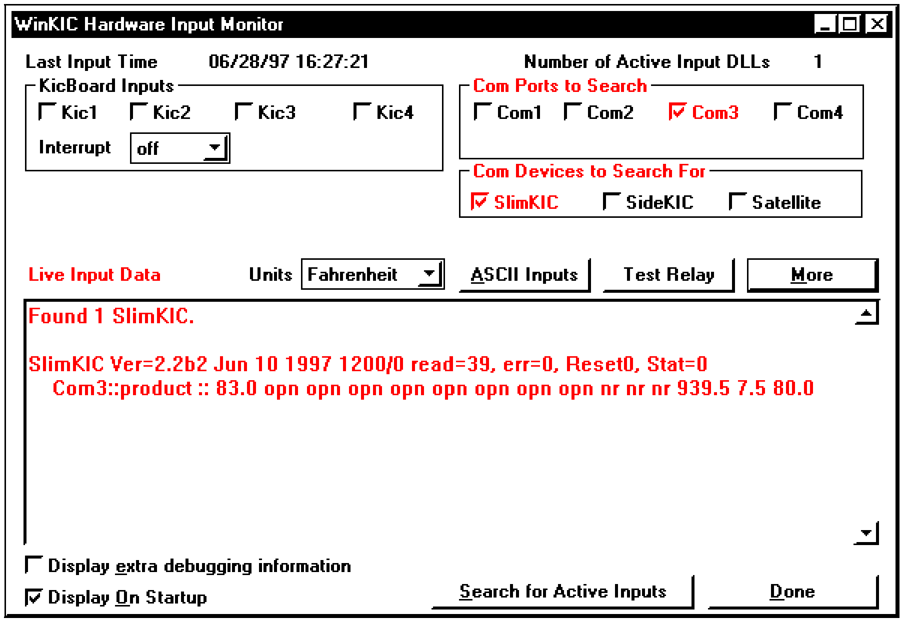
Follow these steps:



- With power off the SlimKIC Thermal Profiler, remove the cover.
- Move the jumper JP3 from the ON position to the OFF position.

  Note: Since the radio transmitter of the SlimKIC Thermal Profiler will not be used, it should be disabled to alleviate the RF signal when not used.

  JP3 provides a hardware means of enabling or disabling the transmitter function of the SlimKIC Thermal Profiler. With pins 2 & 3 jumped (closed) the transmitter function is OFF, or disabled.
- Connect the SlimKIC Thermal Profiler to the computer using the Direct Connect cable, then switch the unit on.
- Start the KIC software and go into the **Hardware Input Monitor**, which is accessible from the **Setup** list menu or pressing ALT+S+H.



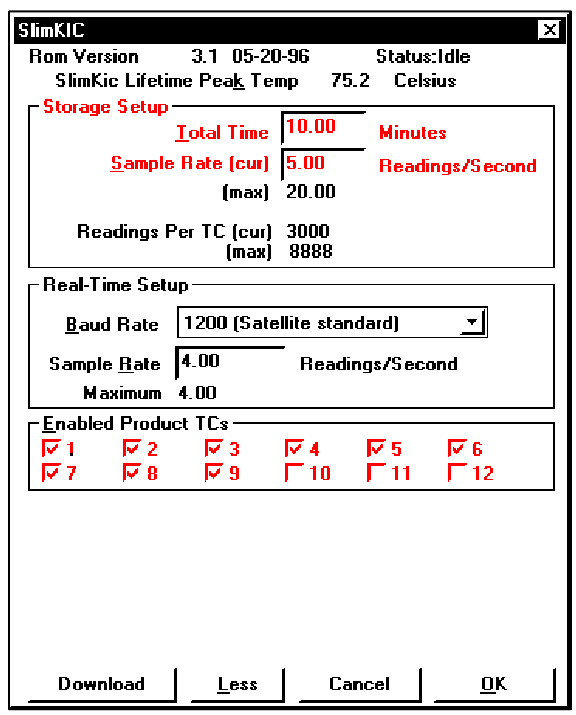
- ✓ In the **COM Ports to Search box**, select the checkbox for the COM port the SlimKIC Thermal Profiler Direct Connect cable is attached to.
- ✓ In the **COM Devices to Search For** box, select the SlimKIC checkbox.
- ✓ In the **Live Input Data** box, ensure that the SlimKIC Thermal Profiler was found and that the data is being updated.
- ✓ Ensure that 9 volt alkaline battery in the SlimKIC Thermal Profiler has an adequate charge to profile.

  Note: If the charge is close to 7.0 volts, you replace the battery with another standard 9 volt alkaline battery.
- ✓ Exit the **Hardware Input Monitor**.

- Select **<u>S</u>limKIC** from the **Setup** list menu or press ALT+S+S. The **SlimKIC Setup** dialog box in will appear.
- Input the total time for the profile in the **Total Time** field of the **Storage Setup** box.

  Note: It's a good practice to automatically add-on an additional 20% to the total time. This will ensure that enough data is buffered should you later decide to use the Profile Prediction tool.
- Input the sampling rate you will use in Readings/Sec in the **Sampling Rate** field of the **Storage Setup** box.

  Note: The Total Time and Sample Rate capabilities are inversely related. An increase in



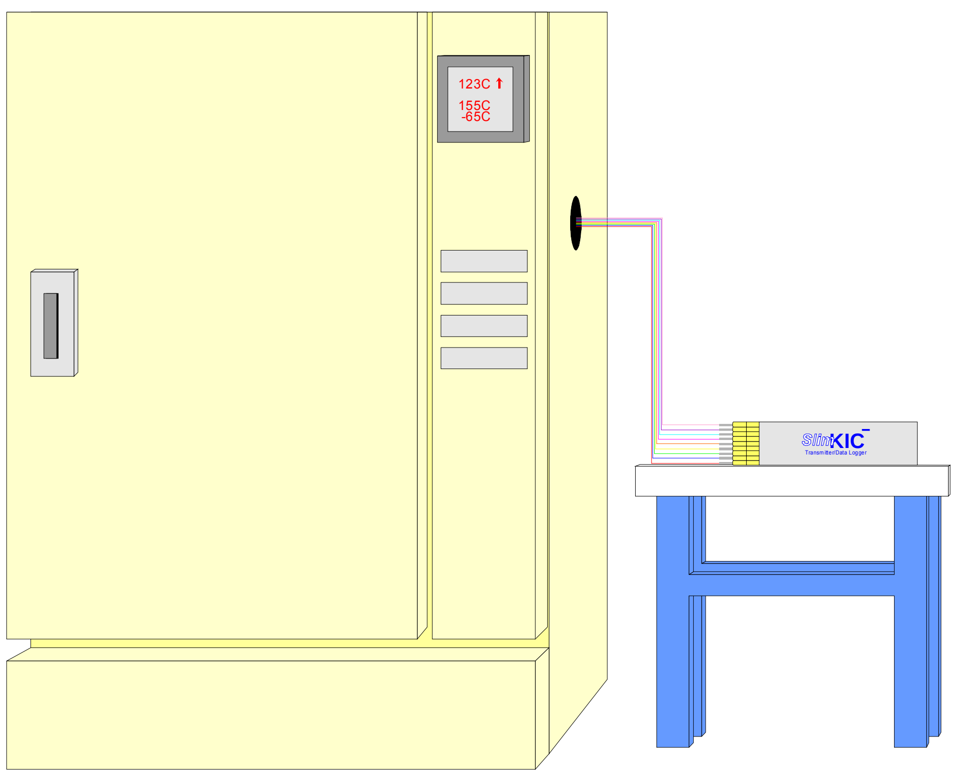
Total Time may result in a decrease of the Sampling Rate if the capabilities of the current Sampling Rate's settings are exceeded, and vice-versa.

- Select or deselect the Product TCs that you'll be using in the **Enabled Product TC's** box.

  Note: Deselecting thermocouples that will not be used during the profile can help increase the maximum number of total data readings for the remaining thermocouples that you will use. However, you cannot deselect TC1.

- Click on the **OK** button to write the changes to the SlimKIC Thermal Profiler memory. The SlimKIC Thermal Profiler's data acquisition attributes are now properly setup for the work.
- Turn OFF the SlimKIC Thermal Profiler and Disconnect the Direct Connect cable.
- Transport the SlimKIC Thermal Profiler to the oven and attach the thermocouples to the SlimKIC.
- Turn the SlimKIC Thermal Profiler ON and ensure that it's emitting a beeping noise, indicating that it's working.
- Lift the SlimKIC Thermal Profiler's START switch up. The profile is now started.

  Note: If the SlimKIC will be placed inside a heated chamber, you must use the SlimKIC's Thermal Shield to protect the SlimKIC from heat damage. You must weigh the maximum heat of the chamber versus the Thermal Shield's ability to protect the SlimKIC. ***The maximum internal temperature that the SlimKIC is designed to withstand is 100ºC.***



When performing a Data Logged profile on chambered temperature processes, such as temperature cycle machines, burn-in ovens, etc., place the SlimKIC Thermal Profiler outside the oven. Most equipment manufacturers provide adequate through-hole ports that allow entry for external instrumentation. The Thermal Shield will not be needed when the SlimKIC Thermal Profiler is setup in this fashion.

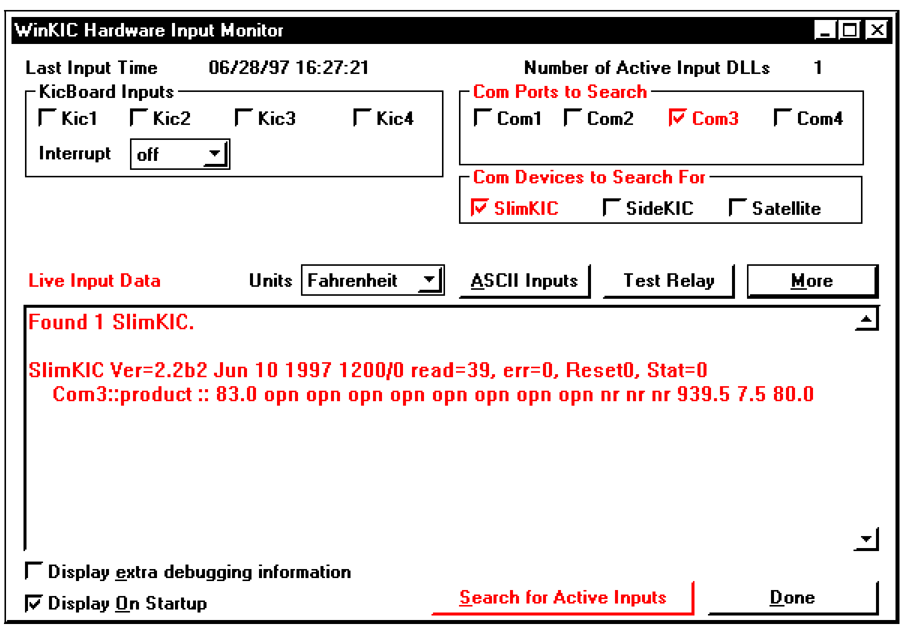
- When the profile is finished, disconnect the thermocouples transport the SlimKIC Thermal Profiler back to the computer.

  Note: DO NOT turn off the SlimKIC Thermal Profiler! The data WILL be lost if you remove power from the SlimKIC.

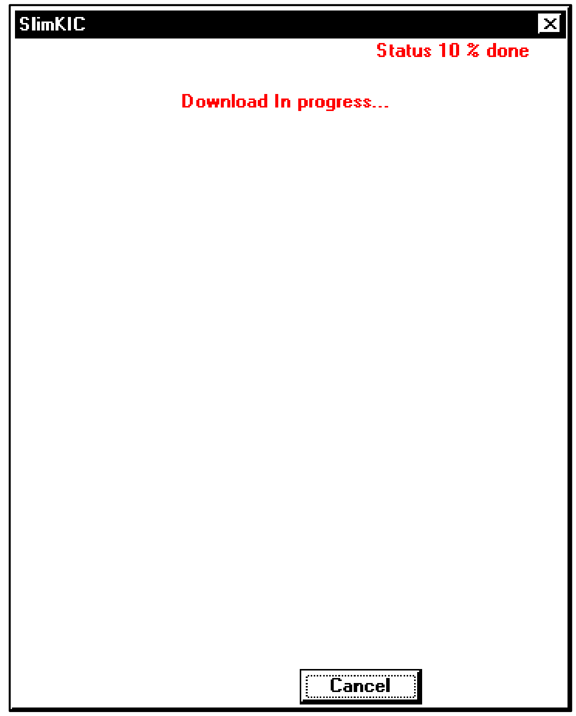
DOWNLOADING

- Attach the Direct Connect cable to the SlimKIC Thermal Profiler.

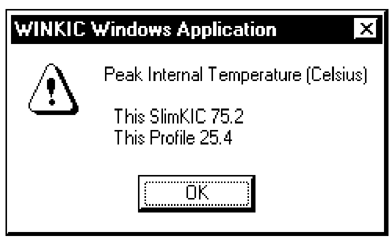
- If the KIC software is not running, start it now and open the oven to which this temperature data will be down loaded.



Note: Accessing the KIC software's ***Hardware Input Monitor*** *and clicking on the* ***Search for Active Inputs*** *button may be required is order for the KIC software to reacquire the SlimKIC Thermal Profiler on the designated COM port.*



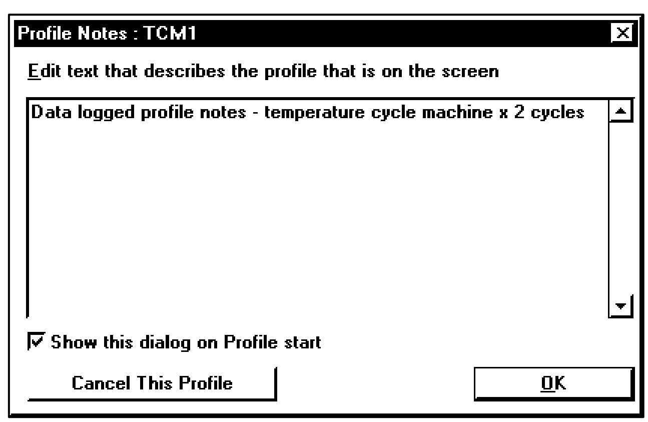
- From the **Setup** list menu, select **Download SlimKIC Data**. The SlimKIC dialog box will appear and show the progress of the download in terms of percentage of the total data.
- When the download is completed, a dialog box will appear showing two temperatures Peak Internal Temperature for the SlimKIC (in it's lifetime), and Peak Internal Temperature for the SlimKIC (for this profile).



Because data logging typically entails collecting data "in the blind", it's not possible to monitor the SlimKIC Thermal Profiler's internal temperature throughout the progress of the profile. This dialog box provides critical information about the internal temperatures that the SlimKIC was exposed to during the profile. **Neither of these values should ever exceed 100ºC**.

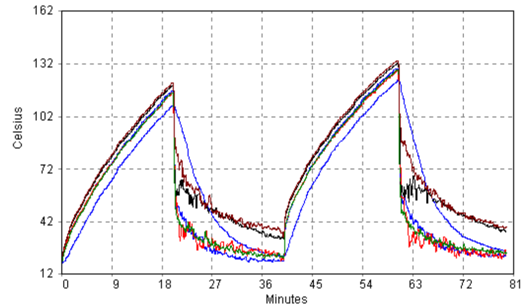
Note: If the SlimKIC Thermal Profiler's peak internal temperature exceeds 100ºC, you should contact KIC Technical Support as soon as possible. Further use of the SlimKIC Thermal Profiler under this condition may provide inaccurate temperature data and/or erratic operation of the unit.

- Click on the **OK** button of the **Peak Internal Temperature** dialog box. The Profile Notes dialog box will appear.

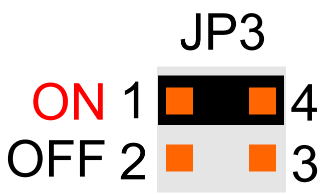


*Note: If you've deselected the **Show Edit Profile Notes on Profile Start** checkbox in the **Global Preferences** dialog box (Setup/Global Preferences, or ALT+S+G) the Profile Notes dialog box will not appear.*

- Input any applicable notes and click on the **OK** button. Your temperature profile will appear on the X/Y-graph.



- Replace the jumper JP3 from the OFF position, back to the ON position inside the SlimKIC Thermal Profiler.



Note: This will ensure that when you're ready to use the SlimKIC Thermal Profiler again for a live profile via radio transmission, the jumper is in the correct position. JP3 provides a hardware means of enabling or disabling the transmitter function of the SlimKIC Thermal Profiler. With pins 1 & 4 jumped (closed) the transmitter is ON, or enabled.

- Use the Analysis Tools provided in the KIC software to examine your profile.

Continuous Profiling Procedure

Continuous Profiling is the capability of enabling the computer to automatically start a new profile at the end of a previous profile. Once setup and started, it requires no other interaction by the user. Profile Notes are automatically appended with a sequentially incremented integer value to denote the repetition of the cycle.

The Continuous Profiling method will continue to cycle (nonstop) until either terminated by the user, or the voltage on the onboard battery of the SlimKIC, SlimKIC-II or SideKIC Thermal Profiler becomes too low to support their operations.

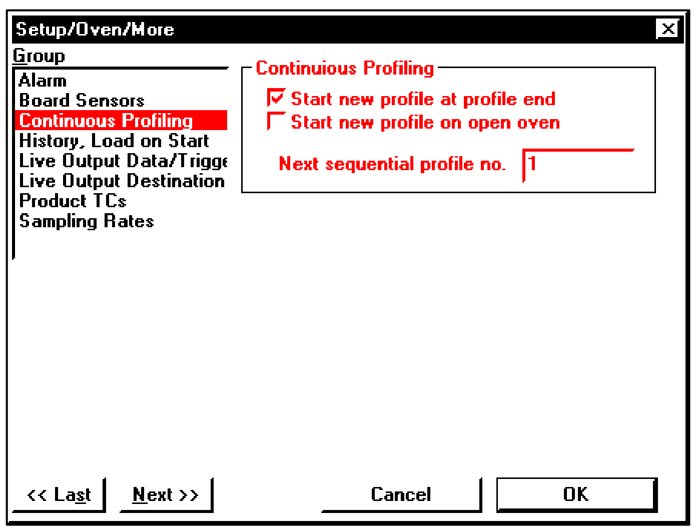
When performing a Continuous Profile with the SlimKIC, SlimKIC-II or SideKIC Thermal Profiler's physically located outside the process under testing, it's possible to purchase a common 9 volt AC adapter (available from most electronics retail outlets) that can be used to ensure the extended operation of these Thermal Profiler's beyond a typical 6 to 8 hour period.

If you will using a standard 9 volt Alkaline battery, you should coordinate the start of the Continuous Profile and it's subsequent termination by the user to ensure that you do not exceed the typical life of the battery (between 6 and 8 hours).

With the exception of the Data Logging profile method, all other methods can employ the use of Continuous Profiling.

SETUP

To setup enable the oven to facilitate Continuous Profiling, follow these steps:

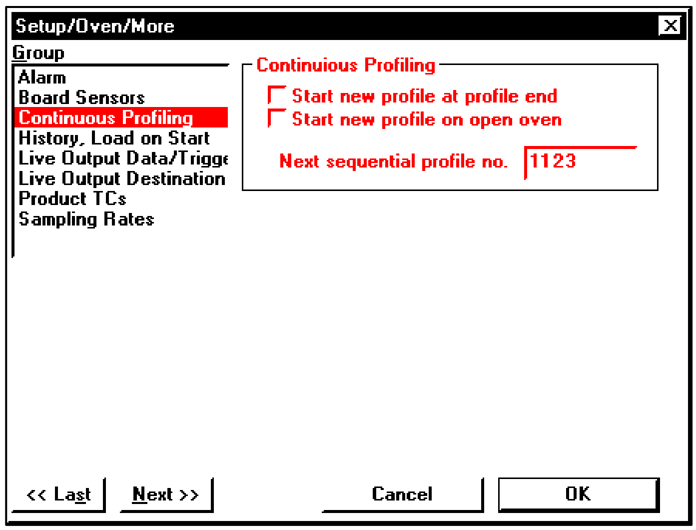


- Start the KIC software and open the oven file for the oven that you will be performing a Continuous Profile.
- Select **Oven** from the **Setup** list menu, press ALT+S+O, or click on the  icon. The Setup Oven dialog box will appear.
- Select the **More** button. The **Setup/Oven/More** dialog box will appear.
- Select the Continuous Profiling group from the Group list.
- Select the **Start New Profile at Profile End** checkbox. This will enable the Continuous Profiling mode.
- If you want to have the Profile Notes automatically filled with sequentially incremented integer values to denote each cycle during the profile, input the numerical value that you want to start with in the **Next Sequential Profile No.** field.

- To further provide further automation of this task you can additionally select to have the Continuous Profile started immediately upon opening this oven file. To do this, select the **Start New Profile on Open Oven** checkbox.
- Click on the **OK** button of the **Setup/Oven/More** dialog box.
- Click on the **Save** button of the **Setup Oven** dialog box. The enabled Continuous Profile settings are now saved with this oven setup.
- Click the **Done** button of the **Setup Oven** dialog box to exit back to the main KIC software screen.
- Follow the setup procedures for the method you will be using to profile (with exception of the Data Logging method).

TERMINATING A CONTINUOUS PROFILE

Once started, a Continuous Profile will continue to run until interrupted by the user.



To terminate a Continuous Profile, follow these procedures:

- Select **Oven** from the **Setup** list menu, press ALT+S+O, or click on the  icon. The Setup Oven dialog box will appear.
- Select the **More** button. The **Setup/Oven/More** dialog box will appear.
- Select the **Continuous Profiling** group from the **Group** list.
- Deselect the **Start New Profile at Profile End** checkbox. This will disable Continuous Profiling mode.
- Deselect the **Start New Profile on Open Oven** checkbox at your discretion. Doing so will prevent subsequent automatic profile starts when the oven file is opened at a later time.
- Click on the **OK** button of the **Setup/Oven/More** dialog box.
- Click on the **Save** button of the **Setup Oven** dialog box. The disabled Continuous Profile settings are now saved with this oven setup.
- Click the **Done** button of the **Setup Oven** dialog box to exit back to the main KIC software screen.

PROFILE ANALYSIS TOOLS

The KIC software provides a powerful array of tools that allow you to quickly analyze your product profile and oven temperature data. To provide further versatility, many of the data can be easily moved into other software applications to allow you to apply your own customized analysis.

Note: Immediately following Tools summary is a section called Using Standard Settings. Please take the time to read this section as it pertains to which settings in the KIC software will impact your data analysis if changed.

The following is a summary of the Tools provided with the KIC software:

- **Event Browser Tools** – The Event Browser is a powerful database that provides a customizable listing of all “events” that occur when the KIC software is running. When the KIC software is running, events such a profiles, recipe changes, etc., are automatically logged to the Event Browser in real-time. Literally, there is no need to “save” a profile after it is finished because the profile information (while in progress) is constantly being saved to the hard drive.

  The Event Browser also provides unprecedented access to these events. You can “scroll” to an event of interest, or “jump” to a particular date and time as needed. These events are automatically stamped with the Date and Time of the event, so there is no guesswork as to which profile was run in what sequence.

  The VCR buttons provide full control over replaying a profile from start to finish. The profiles can be played forwards or backwards are different speeds and can also be paused as needed to allow you to apply other data analyses tools at a particular segment of time.

- **Statistic Table Tools** – The Statistic Table provides a means of displaying and analyzing the critical statistics of the profile data and allows you to select which statistics to display and which baseline temperatures to use.

  The Statistic Table is organized in a columnar format per statistic, with the rows corresponding to each thermocouple. Mean, Range and Standard Deviation statistics are available to provide you with summary information about the relationship of all the data in each column.

  Statistical information on any profile, whether “live” or from “history”, can be displayed with the statistical used during the conduct of the profile, or changed at a later time to allow you the flexibility of analyzing the profile in many different directions.

  Statistics Limits allow you to attach user defined limitations as to the range, in each direction, a individual or group of statistics can travel before a warning or alarm condition occurs. The Statistics Limits use colored markers that provide a quick and easy means of visually scanning all the Statistics Table cells for wayward values.

- **Pointer Tool** – The Pointer Tool adds another dimension in analyzing segments of the profile data. Whereas the Statistics Table provides analyses using custom defined temperature baselines from the Y-axis scale of the graph, the Pointer Tool provides a means of selecting segments of the profile using time or distance baselines along the X-axis of the graph.

  The temperatures of each thermocouple on the profile can be analyzed where the Pointer Tool intersects the profile segment. Slopes between Pointers can be quickly calculated and analyzed as well. If you need to analyze the Slope between two or more segments along the profile, you simply place the Pointers in the exact locations of the areas of interest.

Using the Pointer Tool, you can quickly analyze the Slopes within a particular oven zone, section of the oven, or stage of a profile.

- **Profile Prediction Tools** – One of the more labor intensive tasks involving thermal profiling is finding the optimum profile that matches all the process specifications. In the past, this task involved a lot of educated guesswork.

  The Profile Prediction Tools removes much of this guesswork and dramatically reduces the time needed to achieve the optimum profile by using the power of computer simulation ("what if" analyses) using the data from your baseline profile. The optimum profile can typically be found in a single profile pass.

  Auto-Predict is an optional feature that completely automates finding the right solutions for your oven temperature setpoints and belt-speed, based on the Statistics Limits you have set that describe to the KIC software your process specifications.

  Using Auto-Predict, you may quickly discover that there are <u>many</u> solutions that meet your process specifications, some more optimal than others. You may actually find that you can achieve your process specifications and increase your throughput at the same time!

- **Virtual Profiling Tools** – Finding the optimal profile is only the first step in achieve process control. You have to make sure that your process stays in control. To do this requires constant monitoring of the temperature profile.

  Physically profiling each and each and every product you pass through your oven is, to say the least, impractical. Virtual Profiling provides a means of using computer simulation, based on raw temperature data from the KICprobes, to constantly monitor the profile of the oven.

  In essence, this is comparable to running a profile on every single product. The Virtual Profile data is saved and stored on the local or network hard drive, ready for quick retrieval should the situation dictate.

- **Screen Tools** – The Screen Tools provide a means of manipulating the view of the X/Y-graph to suit your needs. These tools include the ability to Autosize the graph to fit all currently displayed data, or Zoom tools used to provide a much closer analyses of a profile segment.

- **Data Tools** – The Data Tools provide <u>many</u> ways of moving raw or calculated data in, out, or within the KIC software. These methods include the use of the Windows Clipboard for copy/paste operations, RS-232 serial communications, file outputs and Dynamic Data Exchange (DDE).

  Copy/Paste functions provide a means of Superimposing one or more profile thermocouples atop another. This is used to directly compare the performance of product profiles over time. When Superimposing profiles, the Statistics Table can is used as a means of summarizing the differences between the two or more profiles. Of course, any data copied from the KIC software can be easily pasted into another Windows based application, such as Lotus 1-2-3, Excel, SPSS, etc.

  Live Data Output (optional) provides a means of sending data to another application in real-time. This data can then be analyzed, measured, calculated, summarized and disseminated to suit your needs.

  QC-Calc (optional) uses the Live Data Output feature to provide real-time control charts of each piece of data and provides access to Statistical Process Control of the entire process. You can leave guesswork, assumptions and hunches about your oven's thermal performance by the wayside when you measure it in terms of Cp and Cpk.

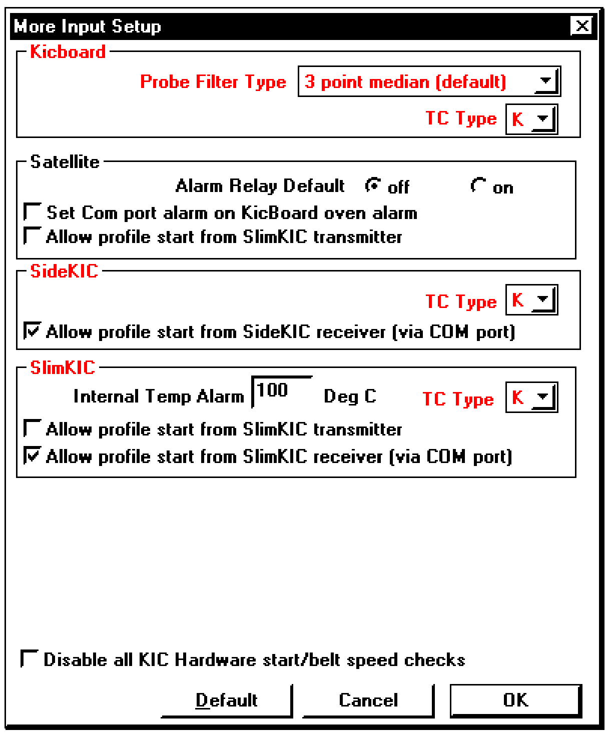
Using Standard Settings

As with anything you else you measure and compare, it's imperative that their "baselines" be the same. Although the KIC software offer's a wealth of flexibility in allowing the user to define their own settings, it's important to note that if these settings are constantly changed it's highly likely that their statistics will change as well making it awkward (if not impossible) to adequately make benchmarks for comparisons.

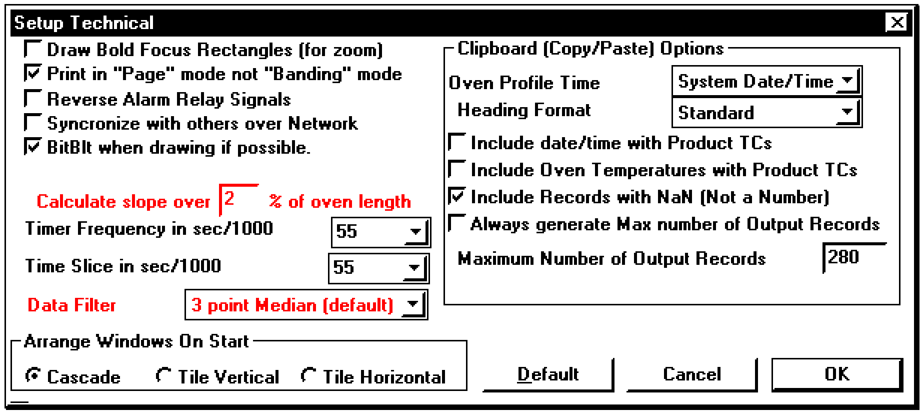
As part of your Process Standard for the KIC system, we recommend that you stick with your chosen settings once you have established what they should be.

The following are settings that can affect the outcome of your data analysis in one form or another:

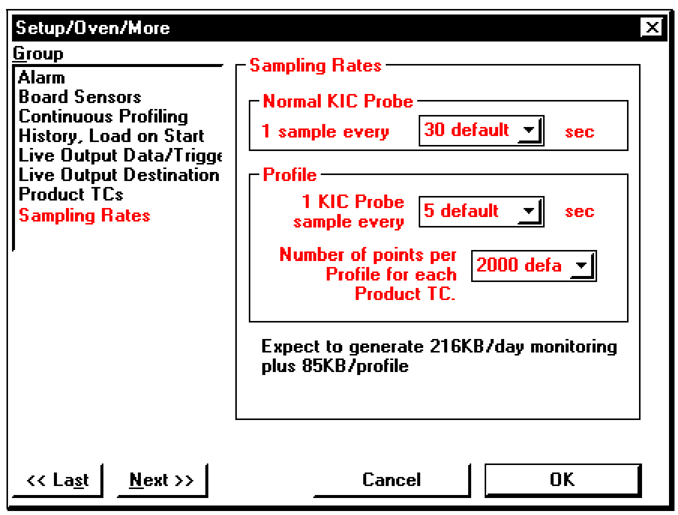
- **KICboard Probe Filter Type** – The default is 3 Point Median. It should normally never be changed.
- **KICboard TC Type** – Type K is the default, It should normally never be changed.
- **SideKIC TC Type** – Type K is the default. It should normally never be changed.
- **SlimKIC TC Type** – Type K is the default. It should normally never be changed.



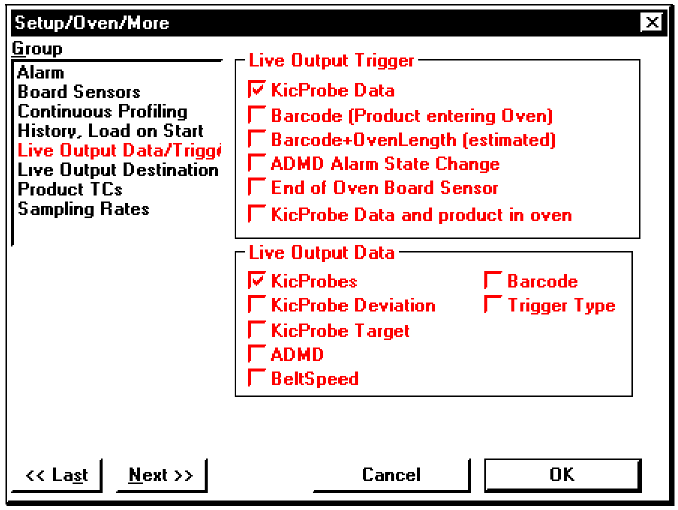
- **Calculate Slope Over x% of Oven Length** – The default value is 2%. In most cases, this value is adequate. Finding a more optimum value would require running several profiles and experimenting with this setting.
- **Data Filter** – The default is 3 Point Median. In most cases, this should never need changed.



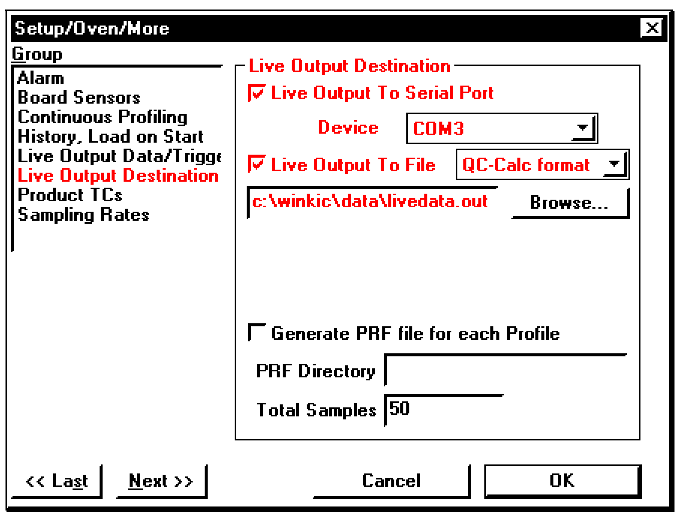
- **Normal and Profile KICprobe Sampling** – The default values are 30 seconds for the Normal Sampling Rate and 5 seconds for the Profile Sampling Rate. In most cases, these values are adequate. If you will be using the optional Live Output feature of the KIC software, you may wish to decrease the frequency for the Normal Sampling Rate.
- **Number of Points per Profile for Each TC** – The default value is 2,000 data points, maximum. Generally, this is just enough to get the job done. This value should never be changed unless you have an application which requires particular data measurement frequency or number of data points to accomplish.



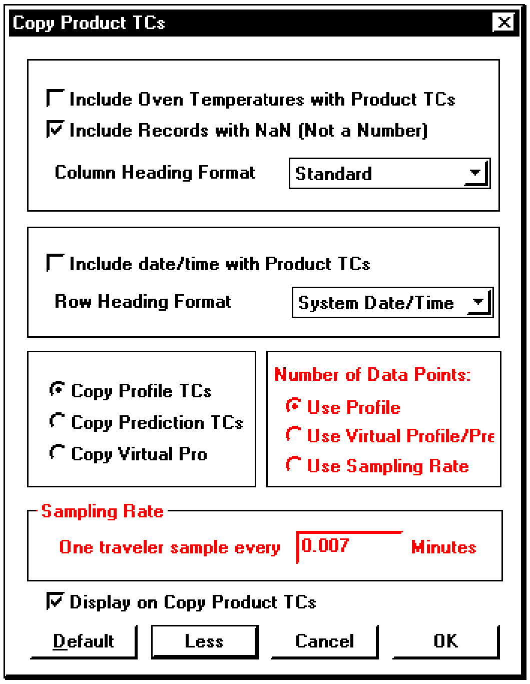
- **Live Output Trigger** and **Live Output Data** – The database application that receives this information is usually “fixed” once the initial output record has been read (such is the case with QC-Calc™). If changes to these initial settings need to be implemented for whatever reason, the application that reads this information needs to be modified to accommodate these new settings.



- **Live Output Destination** – The database application that expects to receive Live Output data from the KIC software expects this data at a particular COM port or in a particular hard drive directory under a given name. If changes to these initial settings need to be implemented for whatever reason, the application that reads this information needs to be modified to accommodate these new settings.



- **Number of Data Points** and **Sampling Rates** (if used) – Whenever you copy raw data from the KIC software for pasting into another oven file or another Windows application, you should always ensure that the same data sampling is used consistently.



Event Browser Tool

The Event Browser is an on-running logbook of all events that occur while the KIC software stands watch.

The events that are logged are:

- **Oven Startup** – This event occurs each time the oven file is opened.
- **Oven Shutdown** – This event occurs each time the oven file is closed.
- **Comments** – This event occurs for each Screen Comment the user generates.
- **Recipes Loaded** – This event occurs each time a recipe is loaded.
- **Profiles** – This event occurs each time a profile is run.
- **Hidden Profiles** – These are Profile events that have been selected by the user as "hidden", and provides some control over deselecting these events for viewing on the Event Browser list.
- **Barcode Numbers** – This event occurs for each barcode that is scanned (optional feature).

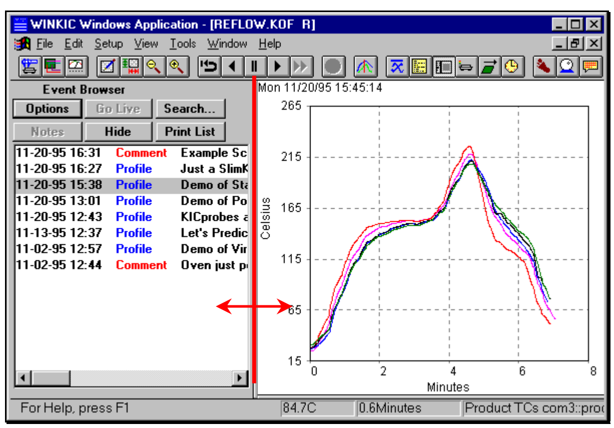
The Browser will give you rapid access to these events. When used in conjunction with the Toolbar Video buttons, the combination provides you with versatility in accessing historical information.

DISPLAYING THE EVENT BROWSER

There are two basic methods for opening and closing the Event Browser:

- Select Event Browser from the View list menu, press ALT+V+W, or click on the  icon from the Toolbar. Each of these will simply open or close the Event Browser.
- Move the mouse pointer to the leftmost edge of the main screen of the KIC software. When the mouse pointer changes it shape (vertical line with horizontal arrows), click and drag the left side of the screen toward the right.

  In addition to opening or closing the Event Browser, this provides some control over resizing the Even Browser's dimensions. The new window size will become the default when opening the Event Browser from the list menu or Toolbar.



EVENT BROWSER CURSOR CONTROLS

Paging through the Event Browser can be accomplished through the use of the scroll bars or by using the following keys:

- **HOME** - Moves the Browser's index cursor to the top end of the history files.
- **END** - Moves the Browser's index cursor to the bottom end of the history files.
- **PAGE UP** - Scrolls the Browser up one page.
- **PAGE DOWN** - Scrolls the Browser down one page.

EVENT BROWSER CONTROL BUTTONS

Six buttons are located on the Event Browser Control panel. These buttons are used to access certain features that help provide further control over what is displayed inside the Event Browser and how that content is displayed.

- **Go Live** – This button takes you out of the History Mode and into the Live Data Mode.
- **Hide/Show** – This button is used to either Hide or Show a profile event.
- **Notes** – This button provides quick means of editing the Notes of a profile.
- **Search** – This button provides access to a search engine that is used to quickly locate certain event types and/or text strings.
- **Print List** – This button will provide a means of printing the events currently displayed on the Event Browser.
- **Options** – This button provides access to a dialog box that allows you to select how the information in the Event Browser is displayed.
- **VCR Buttons** – This group of buttons provide the ability to scroll back and forth through the history files in much the same fashion as a video tape player. These buttons are not found in the Event Browser, but in the Toolbar. They are located here to provide easy access without the need to have the Event Browser displayed.

GO LIVE BUTTON

When available, selecting this button switches the KIC software from the **History Mode** to the **Live Data Mode**.

Note: Anytime you have selected an event from the Event Browser you are in History Mode.

HIDE/SHOW BUTTON

Available only when a Profile or Hidden Profile event is selected from the browser, this button allows you to tag a Profile event as “hidden”.

*Note: Used in combination with the **Event Browser Query Options**, this feature enables you to completely hide from view all **Hidden Profile** event types. Actual deletion of a profile event is not allowed.*

NOTES BUTTON

When available, selecting this button causes the Profile Notes dialog box for the selected profile event to appear. This provides you with the opportunity to edit the

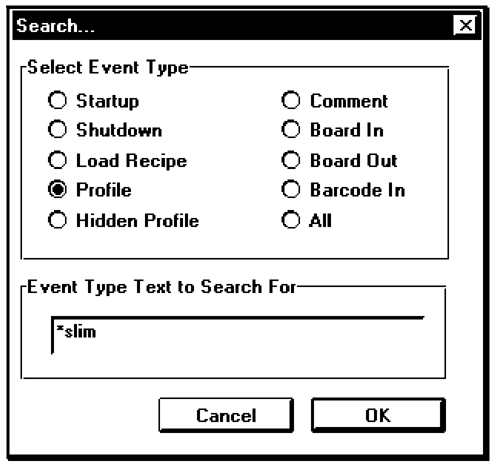
notes of a profile. This button is only available when a Profile or Hidden Profile event is selected.

SEARCH BUTTON

This button allows you to quickly locate events by type as well as by the comments content.

To use Search, follow these steps:

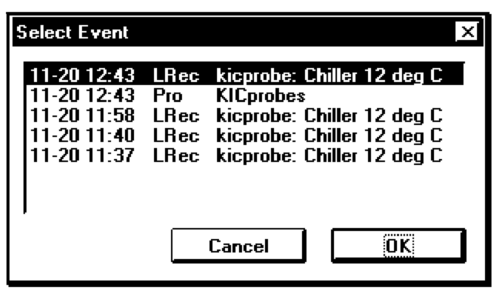
- Click on the **Search** button. The Search dialog box will appear.



- From the **Select Event Type** box, click the radio button of the event type you're searching for.
- In the **Event Type Text to Search For** box, enter your search criteria. This step is only necessary if you wish to narrow your search by the comments text content.

  Note: Asterisks and question marks can be used as wildcards in the search string.

- Click the **OK** button to begin the search.
- If the KIC software finds two or more occurrences of your search criteria, it will display the **Select Event** dialog box.



Note: If the KIC software only finds a single occurrence of your search criteria, it will immediately display the event on the X/Y-graph.

If the event type found is not an event that you currently have selected for viewing through the **Event Browser Options** *button, the KIC software will still move to the event regardless of it's type, it simply won't be displayed on the Event Browser.*

- The **Select Event** dialog box contains all occurrences that match your search criteria. Simply select the event you're interested in and click the **OK** button.
- If the KIC software finds <u>no</u> events matching your search criteria, the KICDBMS.DLL dialog box below will appear.

  Try again by broadening your search using less stringent criteria.

Note: If none of the events on the list meet your needs, click on the ***Cancel*** *button and try again* *<u>by broadening your search</u>* *using* *<u>less stringent criteria</u>.*

Conversely, if your search yields too many hits, and paging through the ***Select Event*** *dialog box list using the vertical scroll bar is not an option, select the* ***Cancel*** *button and try again by* *<u>narrowing your search</u>* *using* *<u>more stringent criteria</u>.*

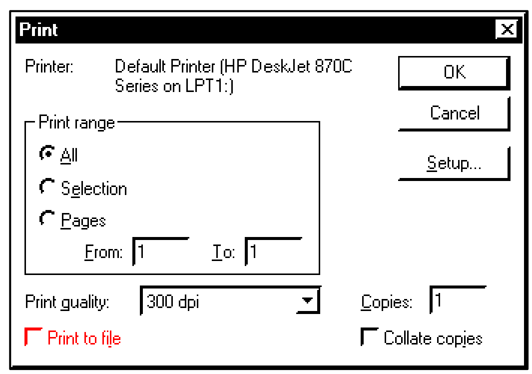
The KIC software doesn't allow the deletion of events stored in the Browser. However, it is possible to edit the notes of profiles or change the notes of a product or recipe setup using the ***Update History*** buttons in their respective dialog boxes.

Because of this, it should be made clear that it is quite possible you may be searching for an event that no longer meets the search criteria.

PRINT LIST BUTTON

The button is used to print a complete listing of the events currently displayed on the Event Browser for documentation purposes. When selected, the Print dialog box will appear.

Note: To have the Event Browser listing dump to an ASCII text file rather than the printer, select the Print to file checkbox.

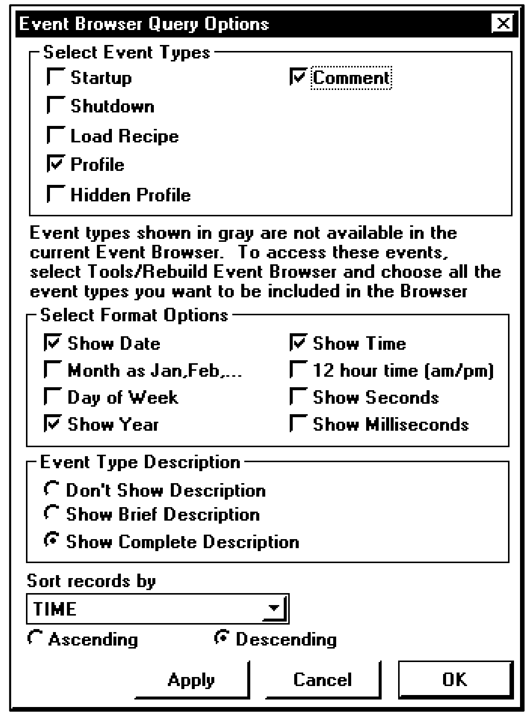



```
Date/Time         Event     Event Description
11-20-95 16:31    Comment   Example Screen Comment
11-20-95 16:27    Profile   Just a SlimKIC
11-20-95 12:43    Profile   KICprobes and more...
```

Example of the list generated from the Event Browser's Print List button.

OPTIONS BUTTON

Selecting this button will cause the **Event Browser Query Options** dialog box to appear. This dialog box provides you with a number of options that are used in presenting the history data in the Event Browser.



To use this feature, perform the following steps:

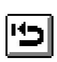
- Select the **Options** button. The **Event Browser Query Options** dialog box appears.
- In the **Select Event Types** box, select the checkboxes for those items you wish to include in the Event Browser listing.

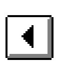
  Note: If some of the checkboxes are gray, they are not available to select. This is either caused by not including them when the Event Browser was last rebuilt by the user, or there are simply none of these event types to display.
- In the **Select Format Options** box, select the checkboxes for the **Date** and **Time** formats you wish to use for each event displayed in the Event Browser list.
- In the **Event Type Description** box, select the radio button that corresponds to how you want the event type displayed on the Event Browser list.
- In the **Sort Records By** area, select how you want the events sorted. **Time** and **Descending** order are the defaults. You can also choose **Event Type** and/or **Ascending** order.

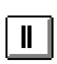
VCR BUTTONS

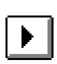
If your event is associated with a period of time, you can use the VCR buttons on the Toolbar to scroll back and forth through the data.

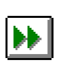
The VCR buttons on the toolbar perform the following functions:

A.  - Replays the current or selected history profile from it's beginning.

B.  - Plays the history in reverse. Multiple clicks will increase this speed.

C.  - Pauses the display when reviewing a profile.

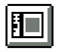
D.  - Plays the history forward (normal). Multiple clicks will increase this speed.

E.  - Brings you back to the Live Mode. This button serves the same function as the **Go Live** button on the Event Browser control panel. When you're finished using the browser, it's best to end your session by selecting the **Go Live** button.

Note: By default, the KIC software will automatically exit the history mode and return to the live mode if no computer keyboard inputs or mouse movements are detected for 5 minutes.

ACCESSING AN EVENT

To select an event from the Event Browser, follow these steps:

- Select Event Browser from the View list menu, press ALT+V+W, or click on the  icon from the Toolbar.

  Alternatively, you can also place the mouse pointer at the leftmost edge of the main screen of the KIC software, hold down the left mouse button and drag the screen to the right

  Note: This method is also used to resize the Event Browser to meet your needs.
- Locate your event by using the mouse to scroll through the list using the vertical scroll bar, use cursor controls, or use the **Search** button.
- Select the event. The X/Y-graph will update with the information from this event and the background color of the main screen will turn to gray, indicating that you are currently in the History Mode.
- If the TC Buttons are currently being displayed, each button will display **HIST** to further indicate that you are currently in the History Mode.

GOTO TIME/FILE

If you would like to quickly go to a particular place in the Event Browser and you already know approximately the date and time of the event you're looking for, you should use the **Goto Time/File** tool.

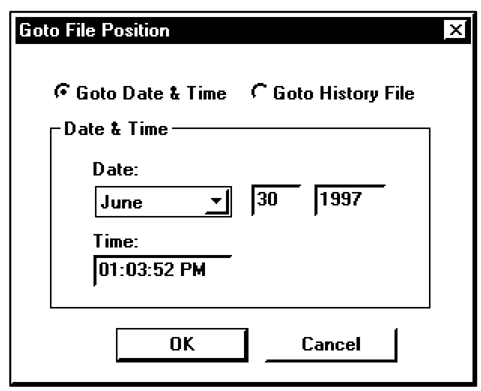
To select this feature, select **Goto Time/File** from the **Tools** list menu, or press ALT+T+G. The **Goto File Position** dialog box will appear.

This dialog box has two different uses:

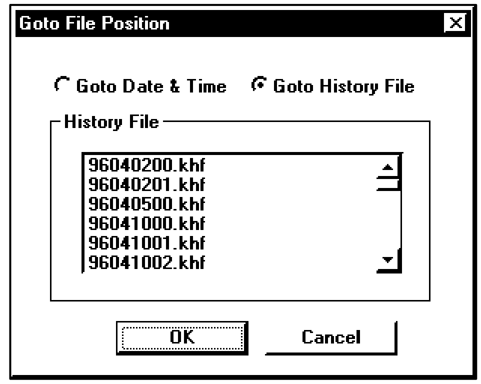
- Go to a particular event, based on the Date & Time
- Go to a particular History File, based on the history file name.

GO TO A DATE AND TIME

- Select the **Goto Date and Time** radio button on the **Goto File Position** dialog box.
- Input the date, or date and time that you want to go to, then select the **OK** button.
- The event nearest this date and time will appear on the main screen of the KIC software.



GO TO A HISTORY FILE



- Select the **Goto History File** radio button on the **Goto File Position** dialog box. A list menu of all the oven's history file will display.
- Click on the history file you want to go to, then click on the **OK** button.
- Once selected, the main screen will be updated with the first event located at the beginning of the history file. Use the VCR buttons to scroll forwards or backwards through the file.

HOW THE HISTORY FILENAMES ARE ASSIGNED

The history files for each oven are stored in their own separate subdirectory using the oven name you chose when the oven was created.

The History filenames are "stamped" with the computer's date using the following format: **YYMMDD##.KHF**

Where:

- **YY** is the year
- **MM** is the month
- **DD** is the day
- ## is the sequential order of the file if more than one is written per day
- **.KHF** is the file name extension (**K**IC **H**istory **F**ile)

Examples:

96040200.KHF – This history file was created on April 2, 1996 and was the first file created on that day.

96041001.KHF – This history file was created on April 10, 1996 and was second file created on that day.

REBUILDING THE EVENT BROWSER

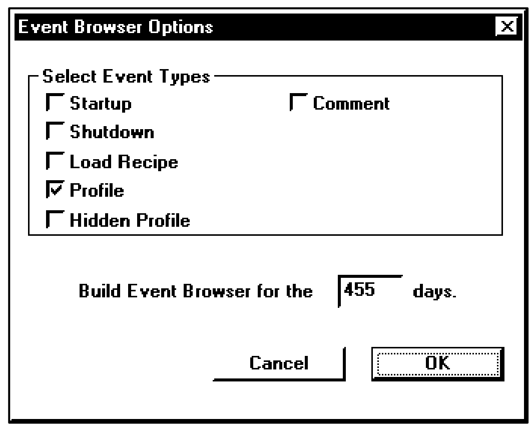
The **Event Browser** is an index database of references that point to their corresponding events stored inside the oven's history files.

If any action rearranges the KIC software's history files (i.e., moved, deleted, etc.) the Event Browser may attempt to look for a record than no longer exists. This situation can cause what is called a SQL (pronounced "sequel") error to occur.

Rebuilding the Event Browser may become necessary if:

- You have installed a newer KIC software version.
- You have removed some of the older oven history files (.KHF) from the hard drive for archiving.
- You have copied an oven file (.KOF) and history files (.KHF) to another computer running the KIC software.
- The computer is abruptly shutdown before while the KIC software is updating the history file or Event Browser.

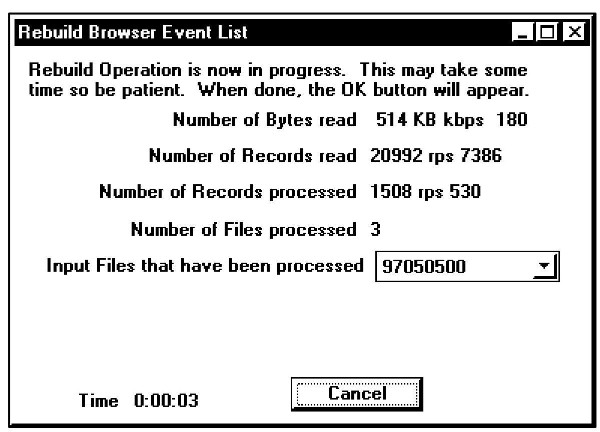
To rebuild the Event Browser, perform the following steps:



- Select **Rebuild Browser Event List** from the **Tools** list menu or press, or press ALT+T+V. The **Event Browser Options** dialog box will appear.
- Select the checkboxes for the **Event Types** that you wish to be included in the Event Browser database.

  Note: Events <u>not</u> included here will <u>not</u> be available in the Event Browser. If there are some events not currently included in your oven's browser, simply rebuild the Event Browser again and include those items.
- Enter the number for days in the **Build Event Browser for the last <u>n</u> days** box.

  Note: The KIC software will automatically examine your history files and input a number that corresponds to the oldest History file found. If you do not wish older data included in your Event Browser, simply enter the number of days you want to include.



- Click on the **OK** button. The **Rebuild Browser Event List** dialog box will appear and the start rebuilding the Event Browser index database.

  *Note: If the rebuild operation is interrupted through the use of the **Cancel** button, only those items that had successfully been rebuilt will*

appear in the Event Browser. Normally, once the rebuild has started it should never be interrupted.

- When the rebuild is complete, click on the **OK** button.

Statistics Table

The KIC software provides a table of statistics that is used to quickly summarize the critical values associated with the temperature profile. When selected for viewing, the Statistics Table appears immediately below the X/Y-graph and represents the values associated with the profile currently displayed on the graph.

STATISTICS AVAILABLE

The KIC software supports the following statistics:

- **Peak Temperature**
- **Minimum Temperature**
- **Maximum Rising Slope**
- **Maximum Falling Slope**
- **Maximum Absolute Slope**
- **Range**
- **Mean**
- **Standard Deviation**
- **Time Above Temperature** (4 user definable available)
  - ✓ **Total**
  - ✓ **Rising**
  - ✓ **Falling**
- **Time Between Temperatures** (3 user definable available)

PEAK TEMPERATURE

For a solder with a melting point of 183°C, the maximum allowable peak temperature is usually between 220° and 230°C. The minimum allowable peak is typically between 195° and 205°C. If the printed circuit board gets too hot, the edges may turn brown.

Also, a temperature of about 230°C can cause damage to the internal dies of the SMT components as well as cause inter-metallic growth formation. If the printed circuit board does not get hot enough, the solder paste will not adequately reflow.

MINIMUM TEMPERATURE

The minimum temperature serves the purpose of documenting the “seed” temperature that will be used for the Virtual Profile. For some applications, such as a Temperature Cycling machine, the Minimum Temperature is a measure of the lowest temperature extreme logged during the profile.

MAXIMUM SLOPE (RAMP RATE)

The maximum slope is usually measured in ° Celsius/second and specifies how fast the printed circuit board temperature is allowed to change. Many components will crack if their temperature is changed too quickly. The maximum rate of thermal change that the most sensitive component can withstand becomes the maximum allowable slope.

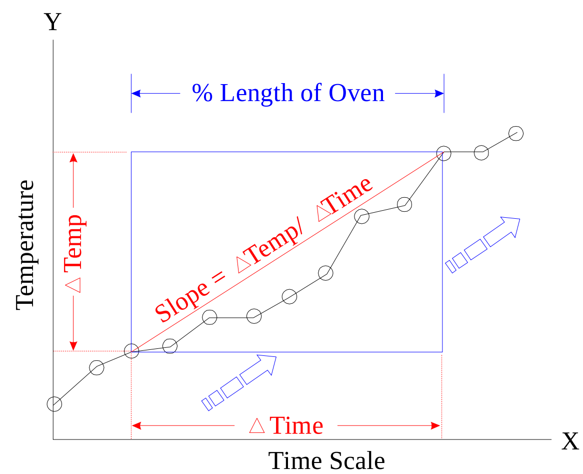
In order to maximize throughput, the printed circuit board thermal profile is usually designed to have a maximum slope just under the maximum allowable. For most companies, the ideal maximum positive slope (ramp-up rate) is somewhere between 2.0° and 4.0°C/second.

In vapor phase ovens, a preheat zone brings the printed circuit board up to about 80°C at 1.0° to 3.0°C/second, but once the printed circuit board reaches the vapor, the ramp rate often exceeds 5.0°C/second.

It is unclear why, but the maximum negative slope (ramp-down rate) is often ignored. It would seem that the maximum allowable slope for a given component would be the same whether the part was being heated up or cooled down, however, a large percentage of customers have profiles with a maximum falling slope that well exceeds the specified maximum allowable rising slope value.

This is especially evident in solder ovens that have a short cooling zone at the end of the process which brings the printed circuit board from above reflow to below reflow relatively quick. As seen in vapor phase systems, it may be that the ramp rate is less critical below certain temperatures.

MAXIMUM SLOPE CALCULATION EXPLAINED



For the purposes of temperature profiling, the term "slope" refers to the magnitude of temperature change (Y-scale) over a given period of time (X-scale).

When determining the maximum rising and falling slopes, the KIC software implements a method that maintains a fixed reference to the oven length. By doing so, the determination of these slopes will be independent of the belt speed and the data sampling frequency, which can change if a belt speed change is made in the recipe, or data sampling intervals are changed in the oven setup.

However, the oven length will never change, which provides an opportunity to define and use a fixed datum from which base-line referenced slopes can be determined and compared from one recipe to the next with 100% confidence.

The oven length (Setup/Technical dialog box) is defined by the user as a percentage of the total tunnel length and is referred to as a "frame".

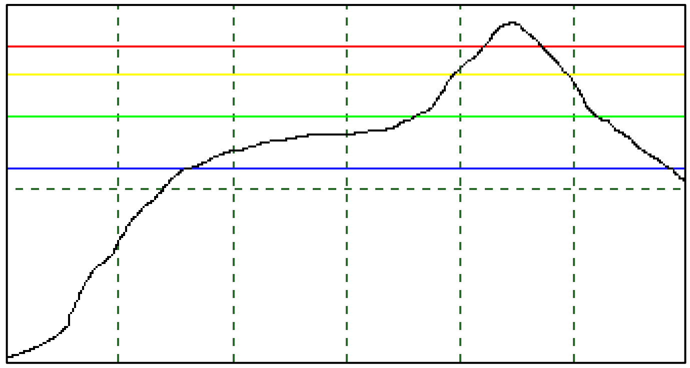
Although this value should be experimented with and clarified to accommodate the particular oven being used when first implementing the KIC system, this percentage must never be changed once the optimum value is found and should become part of the Process Standard.

With the adjustment of the oven's conveyor belt speed the time change within the frame will be automatically accounted for, but the physical distance (again, in reference to the oven's length) will always remain the same base-line distance.

This frame is moved along the product, predicted, or virtual profile one data point at a time. As the frame moves, all slopes between the data points along the profile are evaluated to determine what the maximum slope is and where is resides for each product thermocouple.

Note: This method is used to find the maximum rising and falling slopes through the profile. If closer examination of the slope along a segment of the profile is needed, the Pointer tool should be used instead to create user defined points of reference from which a closer evaluation of a particular area of the profile can be made.

TIME ABOVE TEMPERATURE (REFLOW)

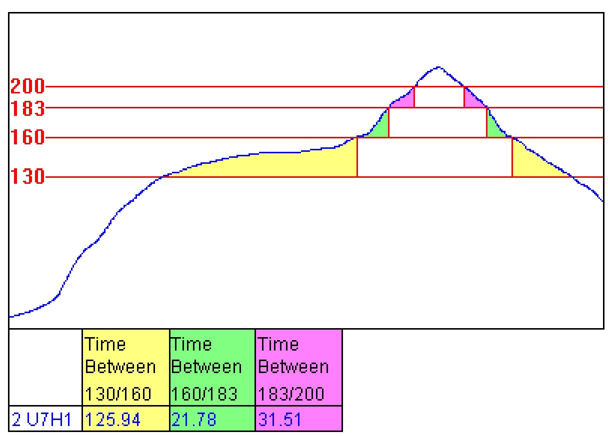


This is a measure of how long the solder on the printed circuit board is a liquid. Many process specifications call for the solder to be above liquidus for between 30 and 60 seconds. However, this seems to be the first specification to be compromised and liquidus times of 90 to 120 seconds are often encountered on the more massive printed circuit boards. If the solder is above the reflow temperature too long, excessive growth of tin-copper inter-metallic leads to a tin-depleted, and brittle solder joint.

It is unclear why the minimum suggested time above reflow is 30 seconds. Most solder experts say the shorter the liquid time, the better. If may be that with only 3 to 6 thermocouples attached to the printed circuit board, there is concern that the coolest spot on the printed circuit board is not being measured.

Therefore, by setting the minimum allowable time at 30 seconds, the chances of an unmeasured spot on the printed circuit board not reflowing properly are minimized. Another possibility is that the solder reflow oven may not always maintain oven temperature during production. Thus, the high minimum reflow time allows a margin of safety against oven temperature drops.

TIME BETWEEN TEMPERATURES



Often times there is a need to know how long the product loiters between two defined temperatures. In solder reflow, this is sometimes defined by both the chemical composition of the solder paste and the thermal mass of the board. Large boards or boards with asymmetrical component loading often need extended "soak" times to ensure minimal temperature deltas prior to reflow.

SUMMARY STATISTICS

Range, Mean and Standard Deviation are all “summary statistics” that are applied to each column of statistics. These calculations are used to provide you with information concerning the relationship between the thermocouples used to perform the profile.

RANGE

Sometimes referred to as “delta-T”, the range is calculated by taking the minimum value in a column of statistics, and subtracting it from the maximum value. If you deselect a particular thermocouple for viewing, it is not included in this calculation.

$$n_{\max} - n_{\min}$$

MEAN

This is the sum of the values, divided by the number of thermocouples currently being viewed. If you deselect a particular thermocouple for viewing, it is not included in this calculation.

$$\frac{\sum n}{n}$$

STANDARD DEVIATION

This is calculated using the population. The population is a column of other thermocouple statistics. If you deselect a particular thermocouple for viewing, it is not included in this calculation.

$$\sqrt{\frac{n\sum x^2 - \left(\sum x\right)^2}{n(n-1)}}$$

SELECTING THE STATISTICS OPTIONS

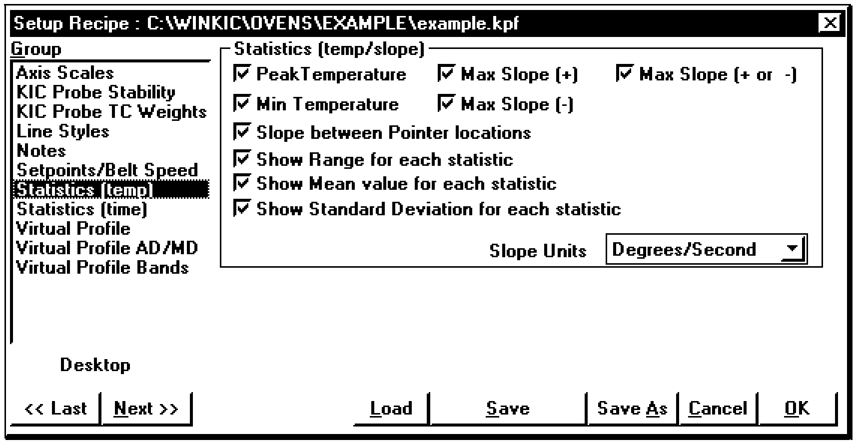
The statistics provided in the KIC software enables you to define and view only those statistics that you deem applicable to your process. Times, slopes, and peak temperatures are all automatically calculated and presented to the user in an easily understood format and are displayed for each individual product thermocouple.

The statistics options presented to you are an aggregate of customer requests. The intention is to use only those statistics which are applicable to your process.

All temperatures are calculated to the nearest 10^{th} of a degree. All times are calculated to the nearest 100^{th}. The reason for this is that if you choose to display your times using minutes instead of seconds, this extra accuracy is needed. *Example: 2 seconds equals 0.03 minutes.*

To use the Statistics, perform these steps:

- To simply display the current selection of statistics, select **Statistics** from the **View** list menu, press ALT+V+A, or click on the icon from the toolbar. The Statistics Table will appear below the X/Y graph.
- Select the **Setup** button just below the Statistics Table. The **Setup Recipe** dialog box in will appear.
- Select the **Statistics (temp)** group.



- Select the **Peak Temperature** checkbox to include a column of statistics that show the highest temperatures of each product thermocouple.
- Select the **Min. Temperature** checkbox to include a column of statistics that show the minimum temperatures of each product thermocouple.

  Note: If all of your product profile's are performed above room temperature (most are) then this value will almost always reflect the room temperature. This information can be used to document the "seed" temperature of the profile, providing evidence that all product TCs were at their proper temperatures prior to the start of the profile.

- Select the **Max Slope (+)** checkbox to include a column of statistics that show the maximum rising slope of each of the product thermocouples.

  Note: This value will be the rate at which your product absorbs heat.

- Select the **Max Slope (-)** checkbox to include a column of statistics that show the maximum falling slope of each of the product thermocouples.

  Note: This value will be the rate at which your product releases heat.

- Select the **Max Slope (+ or -)** checkbox to include a column of statistics that show the absolute maximum rising or falling slopes of each of the product thermocouples.

  *Note: This value will be identical to either the **Max Slope (+)** or the **Max Slope (-)**.*

- Select the **Slope Between Pointer Locations** checkbox to include a column of statistics that shows the slopes between two user defined Pointer locations.

  *Note: See the **Pointer Tool** for more information about this feature.*

- Select the **Show Range for Each Statistic** checkbox to provide a Range summary of all the statistics columns.

  Note: If only one product thermocouple is displayed on the X/Y-graph, the Mean summary will contain zeros.

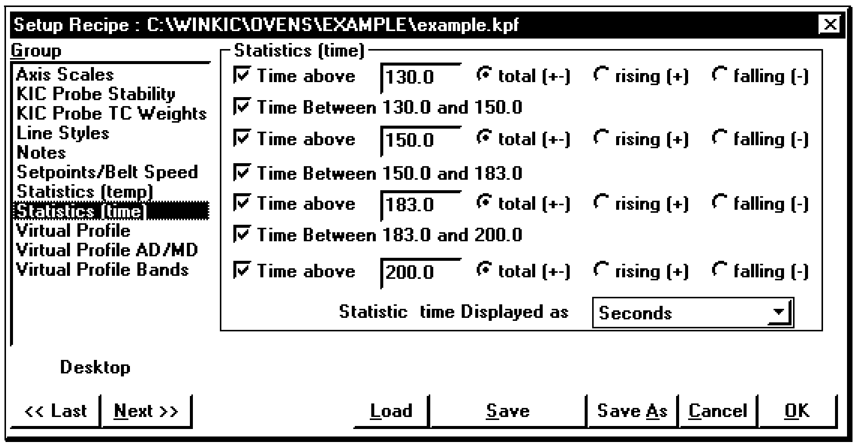
- Select the **Show Mean Value for Each Statistic** checkbox to provide a Mean summary of all the statistics columns.

  Note: If only one product thermocouple is displayed on the X/Y-graph, the Mean summary will contain the same values as the product thermocouple.

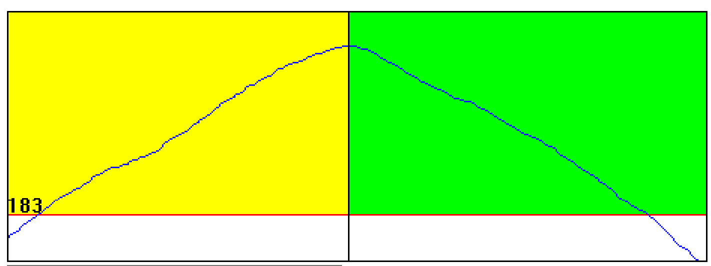
- Select the **Show Standard Deviation for Each Statistic** checkbox to provide a Standard Deviation summary of all the statistics columns.

  Note: If only one product thermocouple is displayed on the X/Y-graph, the Standard Deviation summary will contain no data.

- From the **Statistics Time Displayed As** list menu, select **Minutes** or **Seconds** as the time reference you'll be using to display the Statistics (except slopes).
- Select the **Statistics (time)** group.

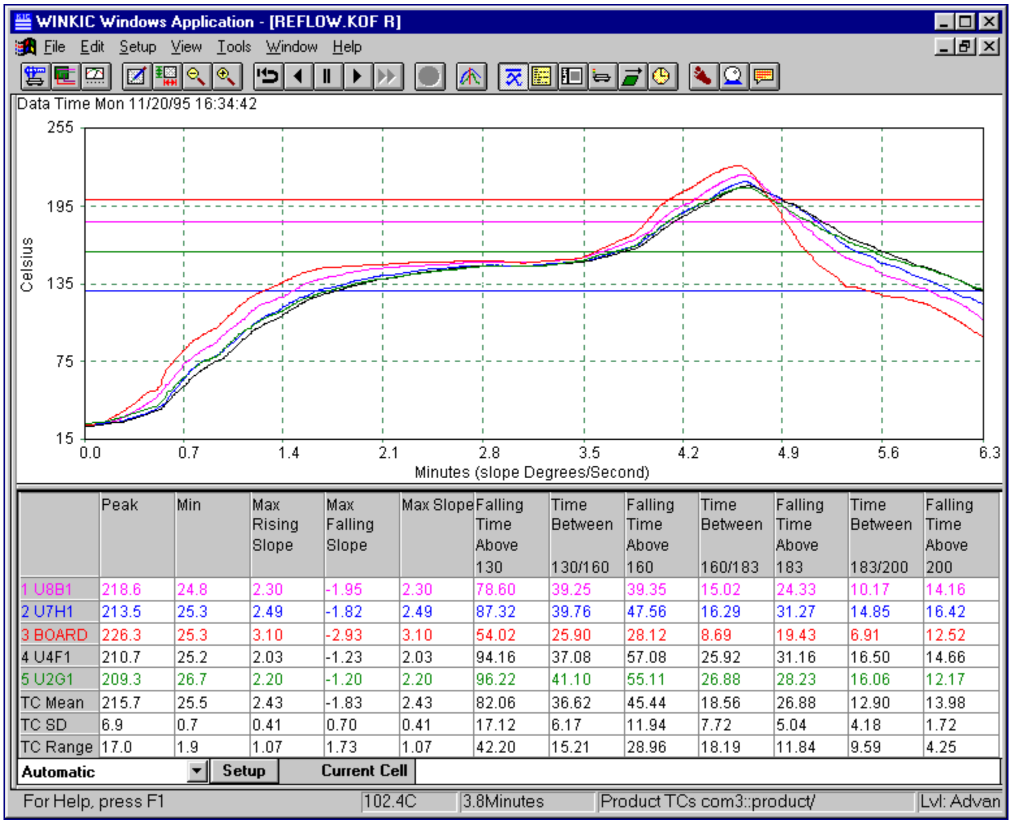


- To select the **Time Above** features:
  - ✓ Place a check mark in the **Time Above** checkbox (left side).
  - ✓ Input the value of the desired temperature reference into the **Time above** field (right side).



	Rising Time Above 183	Falling Time Above 183	Total Time Above 183
2 U7H1	31.51	31.27	62.77

  - ✓ Using the radio buttons to the right of the **Time Above** field, select which portion of the time above the temperature you will be measuring. The options are **Total**, **Rising**, or **Falling**. Only one of these values can be selected.
- Input the temperature value(s) that you will use as a reference point in the **Time Above** field.
- Select the time unit from the **Statistic Time Displayed As** list menu.
- Select the **Save** button to save these Statistics settings with to the recipe.
- Click on the **OK** button. The **Setup Recipe** dialog box will disappear, and the new statistic settings will be reflected in the Statistics table.



	Peak	Min	Max Rising Slope	Max Falling Slope	Max Slope	Falling Time Above 130	Time Between 130/160	Falling Time Above 160	Time Between 160/183	Falling Time Above 183	Time Between 183/200	Falling Time Above 200
1 U8B1	218.6	24.8	2.30	-1.95	2.30	78.60	39.25	39.35	15.02	24.33	10.17	14.16
2 U7H1	213.5	25.3	2.49	-1.82	2.49	87.32	39.76	47.56	16.29	31.27	14.85	16.42
3 BOARD	226.3	25.3	3.10	-2.93	3.10	54.02	25.90	28.12	8.69	19.43	6.91	12.52
4 U4F1	210.7	25.2	2.03	-1.23	2.03	94.16	37.08	57.08	25.92	31.16	16.50	14.66
5 U2G1	209.3	26.7	2.20	-1.20	2.20	96.22	41.10	55.11	26.88	28.23	16.06	12.17
TC Mean	215.7	25.5	2.43	-1.83	2.43	82.06	36.62	45.44	18.56	26.88	12.90	13.98
TC SD	6.9	0.7	0.41	0.70	0.41	17.12	6.17	11.94	7.72	5.04	4.18	1.72
TC Range	17.0	1.9	1.07	1.73	1.07	42.20	15.21	28.96	18.19	11.84	9.59	4.25

Example of four Time Above Temperature reference points being used to evaluate a product profile using 130, 160, 183, and 200°C. The color of the reference lines are user definable.

STATISTIC LIMITS SETTINGS

The Statistics Table consists of “cells” or boxes that represent individual statistic. Each box can be individually assigned a **High Alarm**, **High Warning**, **Low Warning**, and **Low Alarm**.

This flexibility provides you the means to customize the allowable limits for each individual statistic. Although there are numerous combinations of limits that can be setup, you will most likely only use a subset of those available.

Use this feature to provide a quick means of visually scanning the Statistics Table when using the Profile Prediction Tool.

The Statistic Limit settings are saved with the recipe. This ensures that the same Statistics Limits are consistently provided when the recipe is loaded.

STATISTIC NORMAL

When the statistics are within the High and Low Warning values (or the High and Low Alarm values if you choose not to use the Warning settings) you set, a green box will appear immediately to the right of the statistics.

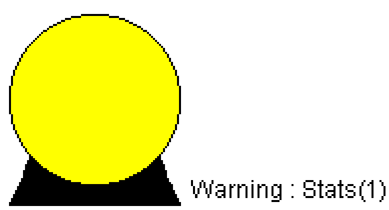
	Peak	
1 U8B1	219.4	
3 BOARD	225.2	
5 U2G1	210.4	

STATISTIC WARNING

When the statistical value is between the Warning and Alarm values, a yellow box will appear immediately to the right of the statistics, and a positive sign **(+)** or negative sign **(-)** will be superimposed inside the box that indicates which direction the statistic is failing.

	Peak	
lVP[01] U8B1	218.2	
lVP[03] BOARD	225.8	+
lVP[05] U2G1	209.2	

Additionally, when a Virtual Profile is being used to monitor the product profile in real-time, the crystal ball will become yellow and indicate at the lower right that a statistic(s) is currently in a warning state.

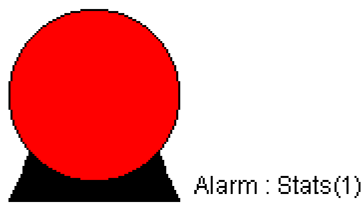


STATISTIC ALARM

When the statistic is outside the Alarm limit setting, a red box will appear immediately to the right of the statistic, and a positive sign **(+)** or negative sign **(-)** will be superimposed inside the box that indicates which direction the statistic has failed.

	Peak	
IVP[01] U8B1	218.2	
IVP[03] BOARD	225.8	+
IVP[05] U2G1	209.2	

Additionally, when a Virtual Profile is being used to monitor the product profile in real-time, the crystal ball will become red and indicate at the lower right that a statistic(s) is currently in an alarm state.



A thorough understanding of how capable and repeatable your process is will allow you to successfully implement the use of the Statistics Limits as part of your process control.

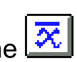
SETTING THE LIMITS

The Statistic Limits allow a minimally trained operator to quickly determine if the product profile meets the process standard. You may set high and low limits on key statistics like peak temperature and time above reflow.

Green boxes lets the operator quickly know that the statistics are within the set specifications. Yellow indicates a warning condition or that the process is moving toward an out-of-control condition.   Red indicates that the process is out-of-control and should be stopped.

Note: A red Statistic Alarm can be used to trigger the KIC Alarm Relay to provide an audible or visual alarm to the operator, or provide a "stop" signal to the input workstation's Programmable Logic Controller causing it to stop feeding product into the out-of-control oven.

To set warning and/or alarm limits on one or more statistics, perform the following steps:

- Select **Statistics** from the **View** list menu, press ALT+V+A, or click on the  icon from the Toolbar. The **Statistics Table** will appear below the X/Y graph.
- Double-click the mouse pointer inside the cell for the statistic you wish to set limits for. The **Change Row/Col** dialog box will appear, indicating the row and column of the cell location in it's windows title bar.
- Click the mouse inside the box(s) for each of the alarm and/or warning limit(s) you wish set, then enter your value(s).   Any combination of warning and alarm values is allowed.

  Note: To completely disable any setting, you must delete the value from the input box.   Entering "zero" will not work, since it's also a legal value to use as a limit.

- To apply these setting(s) to all the statistics within the column, select the **Modify All** checkbox. Deselect the **Modify All** box to apply these settings only to the selected statistic cell.
- Select the **OK** button. Depending on the current value of the statistic in the cell (or all the cells in that statistics column if the **Modify All** checkbox was selected) a green, yellow or red box will appear to the right of the statistic(s).

Once a set of limits have been established for a statistic, selecting the cell with the mouse pointer will quickly reveal it's current status just below the Statistics Table in the Statistics Status Line.

	Peak	Max Rising Slope	Total Time Above 183
1 U8B1	219.4	2.14	64.36
3 BOARD	225.2 +	2.37	60.52
5 U2G1	210.4 -	1.78	62.27
IVP[01] U8B1	218.2	2.40	60.90
IVP[03] BOARD	225.8 +	2.75	59.36
IVP[05] U2G1	209.2 -	2.14	61.70

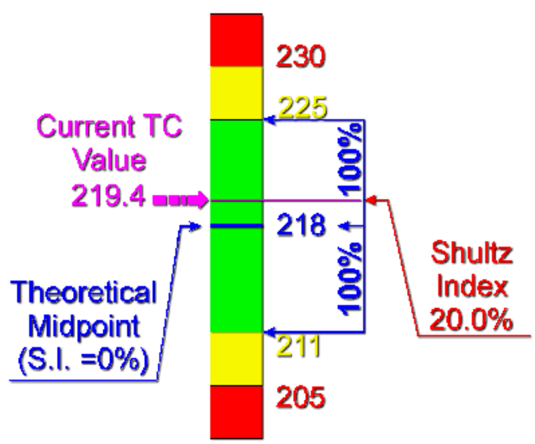
Automatic | Setup | Current Cell | Data=218.2, AlarmHi=230.0, WarnHi=225.0, WarnLo=211.0, AlarmLo=205.0, s.i.=2

The Statistics Status Line contains the following information:

- Data – This is the current value of the statistic cell.
- AlarmHi – This is the Alarm High setting for the statistic cell.
- WarnHi – This is the Warning High setting for the statistic cell.
- WarnLo – This is the Warning Low setting for the statistic cell.
- AlarmLo – This is the Alarm Low setting for the statistic cell.
- S.I. – This is the current Schultz Index value for the statistic cell.

SCHULTZ INDEX

The Schultz Index is a value that represents how "centered" the current statistic cell is between the warning and/or alarm limits, depending on which limits are in use. It is defined as a percentage of the distance from the theoretical midpoint to the limitation settings.



Note: The Schultz Index is instrumental when used with the Auto-Predict feature (optional) to discern which setpoints will yield a group of statistics that tend to move about the theoretical midpoint of the warning and/or alarm limitations defined by the user.

Pointer Tool

When using the Statistics Tool, all baselines are referenced from the Y-axis, or temperature. The Pointer Tool will provide a means of using the X-axis as a baseline that provides the capability of analyzing the temperature data points of the profile against time or distance.

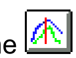
When used in conjunction with the **Slope Between Pointer Locations** feature found in the **Setup/Recipe/Statistics (temp)** dialog box, you can more closely examine slopes along the profile at user defined points (i.e., within a zone or within a whole section of the oven).

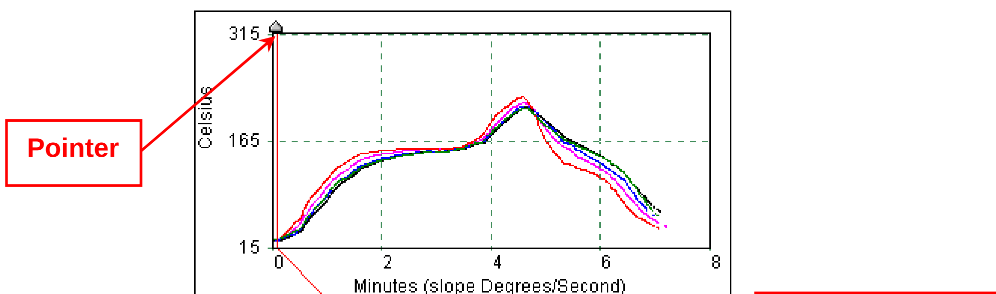
The Pointers are implemented as a form of sliding tab markers that are located immediately on the top of the X/Y-graph. This very flexible feature allows you to more precisely place the Pointers along the X-axis, but also change the location of any individual Pointer without disrupting the placement of the remaining Pointers should the need arise.

Information such as time, temperature, distance, and slope can all be accessed using this feature. The Pointer positions can be saved with the recipe.

APPLYING THE POINTERS

To apply the Pointer Tool, follow these steps:

- Display a profile.
- Select **Pointer** from the **Tools** list menu, press ALT+T+T, or select the  icon from the Toolbar.
  - ✓ A Pointer will appear above the upper left corner of the graph in the form of a sliding tab marker.
  - ✓ A column of statistics will appear indicating the temperatures at the intersection of the Pointer line and the product thermocouples of the profile.

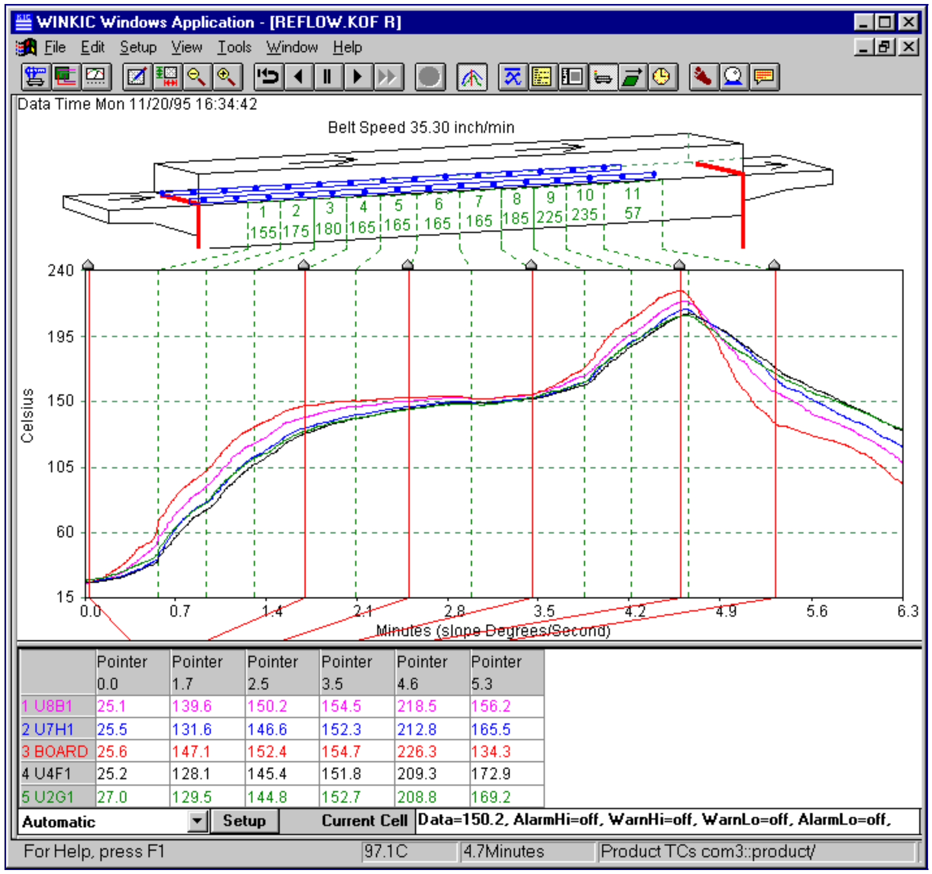


	Pointer
	0.1
1 U8B1	25.8
2 U7H1	26.3
3 BOARD	26.5
4 U4F1	25.6
5 U2G1	27.7

- Place this Pointer in the desired location in reference to the X-axis. Do this by clicking and dragging the Pointer with the mouse horizontally and observing the X-axis location as indicated by the numerical value in the statistics column heading.

Note: As you move the Pointer away from the upper left corner of the graph you will notice that there are more Pointers located here. Up to 6 Pointers are available.

- Repeat these setup steps until you have either used enough Pointers to suit your needs, or all 6 Pointers have been used.



Example of a typical usage of the Pointer Tool to examine the product thermocouple temperatures at designated points along the X-axis

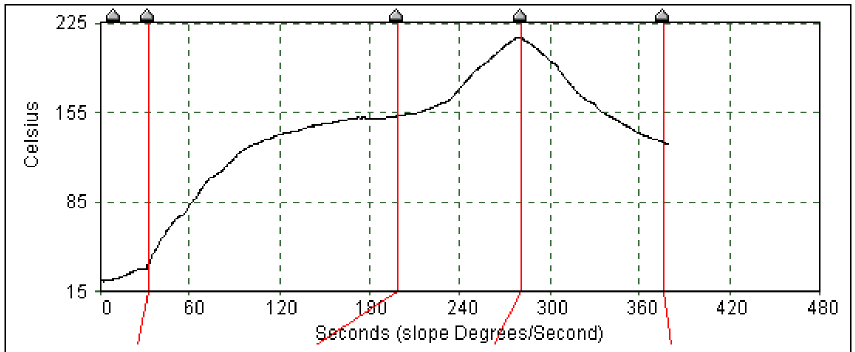
POINTER SLOPES

The maximum rising and falling slopes use a defined frame of distance with which a maximum slope is resolved for each thermocouple. However, there are times when the user may desire to analyze the maximum slope only within a particular segment of the profile.

By using the Pointer  Tool, it's possible to place vertical markers at selected points along the X/Y-graph that segment the profile. A column of statistics will appear on the Statistics Table showing the temperature value of each product thermocouple where the vertical marker and the thermocouple intersect.

With the **Slope Between Pointer Locations** selected, an additional column of data will appear between each temperature column that reveals the maximum slope between the selected points.

When using the Pointers, the column headings will include the value of the X-axis intersection for whichever type of X-axis scale that is currently active. However, when including the Slope Between Point Locations option, the slope column headings will include a value that reflects the difference between the adjacent Pointer columns.



	Pointer 32.5	Slope 166.07	Pointer 198.6	Slope 83.03	Pointer 281.6	Slope 94.19	Pointer 375.8
4 U4F1	37.0	0.69	151.8	0.73	212.3	-0.87	130.4

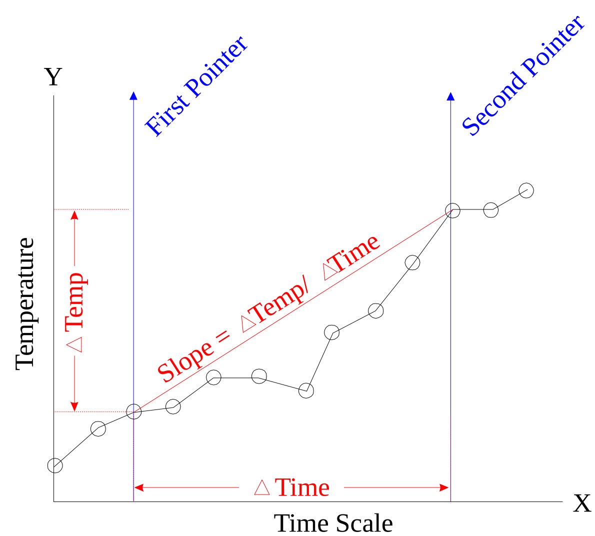
By selecting the Slope Between Pointer Locations option, a column of maximum slope data will appear in the Statistics Table for each pair of Pointers that define a segment of the profile.

POINTER SLOPE CALCULATION EXPLAINED

Unlike the method used to determine the maximum rising and falling slopes within a profile, the Pointers tool does not use (or need) the framing method.

As each Pointer is placed onto the X/Y-graph, it is understood that a simple slope will be calculated between the intercepts of the Pointers and the profile.

This method provides maximum flexibility in allowing the user to determine what segments of the profile should be considered for closer examination.



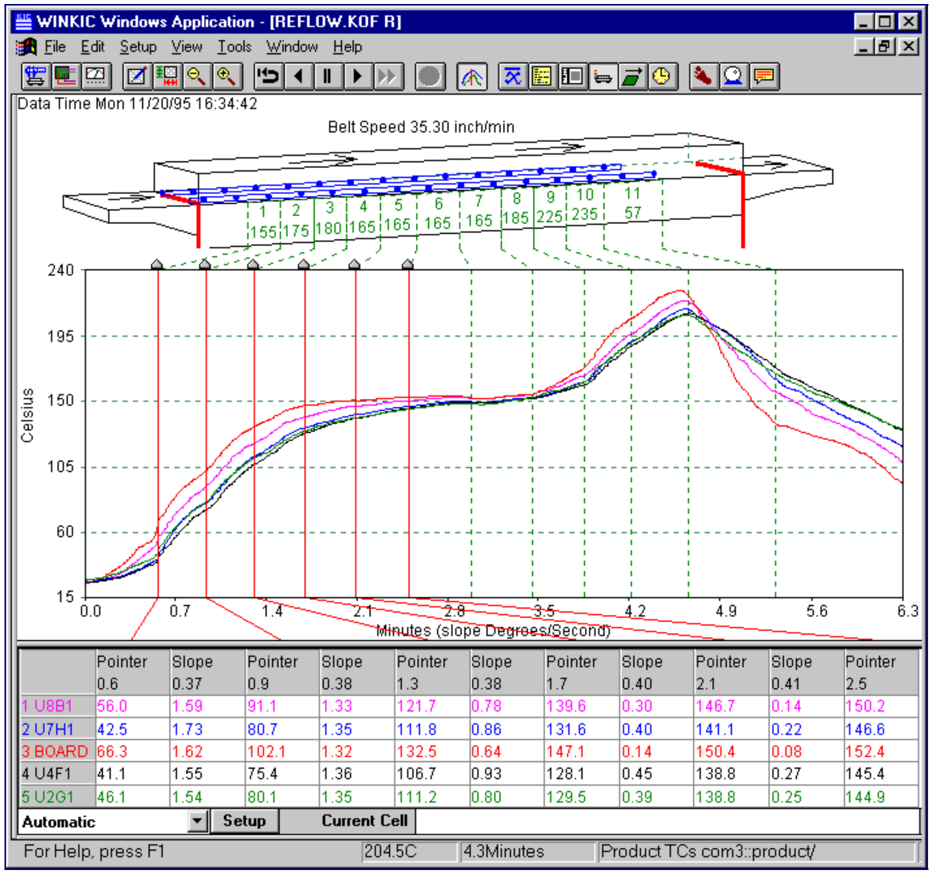
Note: To determine the slope within a particular oven zone, simply display the oven (View/Oven) and place a Pointer at the beginning and end of each zone.

USING THE SLOPES BETWEEN POINTERS FEATURE

To examine the greatest slope for each product thermocouple between each of the set Pointers, select the **Slope between Pointer locations** checkbox in the **Statistics (temp)** group of the **Setup Recipe** dialog box.

A new column of data, labeled “Slope” will appear between any two columns of Pointer data in the Statistics Table.

- The header of the **Slope** column contains a numerical value that represents the X-axis difference (either in time or distance, depending on whichever scale you've chosen) between the two **Pointer** columns.
- The values for each cell in the **Slope** column represent the greatest slope between the two corresponding cells (located to the left and right of the cell) in the **Pointer** columns for each product thermocouple.



This example shows the use of the Pointer Tool to examine the greatest slopes within oven zones 1 through 5 for each product thermocouple.

HIDING THE POINTERS

To "hide" the Pointers that are currently setup but maintain their positioning for later use, select **Pointer** from the **Tools** list menu, press ALT+T+T, or select the  icon from the Toolbar.

DELETING THE POINTERS

To completely delete the current setup for a group of Pointers, select **Clear Pointers** from the **Tools** list menu or press ALT+T+O. This deletion will not be permanent until saved with the recipe.

Profile Prediction Tools

Profile Prediction is a tool that furnishes you with the power of computer simulation to assist in determining which combination of zone setpoints and conveyor belt speed will generate the optimum profile for your process.

To use this feature, you must first perform an initial profile that allows the KIC software to establish the relationship between the product profile and the oven setpoints & belt speed.

Note: If you are using the Prophet Thermal Manager system, this relationship is further optimized through the use of each KICprobe thermocouple. Because the KICprobes provide more points along the oven, a greater amount of points with which to correlate this relationship are available.

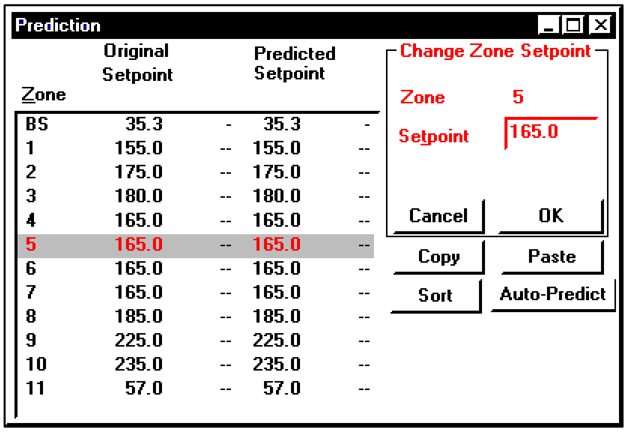
Using this base-line profile, you then interact with the KIC software using "what-if" analysis of the zone setpoints and belt speed values to quickly establish or fine-tune the profile.

If you have purchased the **Auto-Predict** option, most the Profile Prediction is completely automated by the KIC software.

STANDARD PROFILE PREDICTION

To use Profile Prediction, follow these steps:

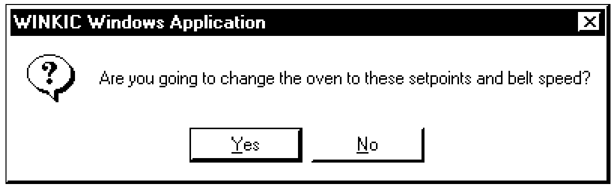
- Display a profile. Either run a new profile or select one from the Event Browser.
- Ensure that the statistics for the recipe are correctly setup:
  - ✓ Select the statistics from the Setup Recipe dialog box that you will need to define the limits of your process specification.
  - ✓ Input the warning and/or alarm limits for at least one of the columns of statistics that you selected from the Setup Recipe dialog box.
- Select **Prediction** from the **Tools** list menu, press ALT+T+P, or select the  icon from the Toolbar. The standard **Prediction** dialog box will appear.



- To change any of the zone setpoints or belt-speed, select item from the list provided, input it's new setpoint in the **Setpoint** field, then select the **OK** button.

  Note: Changes greater than 20% of the starting value will yield inaccurate results.

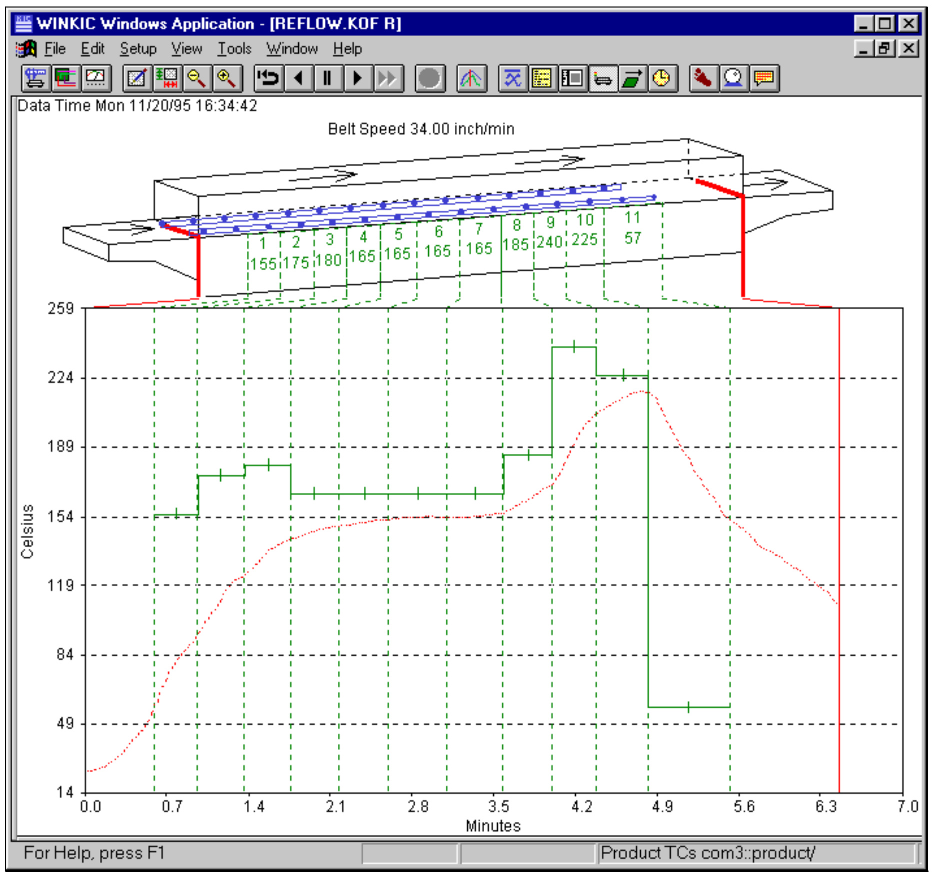
- Select the **Done** button. A confirmation dialog box will appear reminding you that these oven setpoints need to be made to the oven as well.



- Select on the **Yes** button to save the changes.

  Note: You must be sure to make these changes to your oven's zone setpoints and/or belt speed to achieve the predicted results.

- A Guide Profile, representing thermocouple #1, will appear on the X/Y-graph. This guide profile will remain on the graph during the next profile allowing you to verify the accuracy of the prediction.



*Note: To hide the Guide Profile from view, deselect the **Guide Profile** from the **View** list menu.*

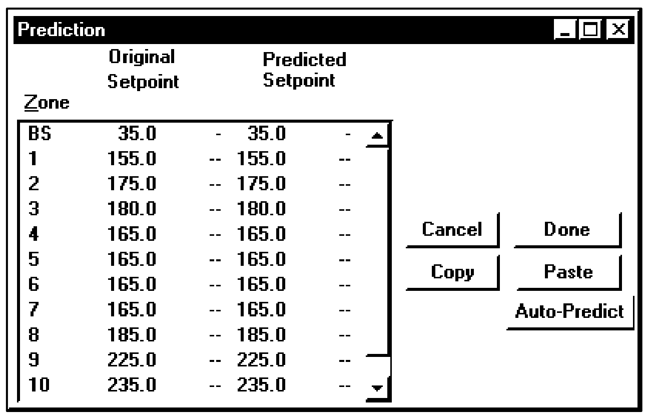
- Perform a "verification" profile to test the predicted results. Again, use the combination of the statistics table and statistic limits to achieve the quickest results.

AUTO-PREDICT (OPTIONAL)

Welcome to Auto-Predict! This tool can help you quickly find the zone setpoints and conveyor speed that will bring your product profile within specification. Before you start the Auto-Predictor, you must have limits set on key profile statistics.

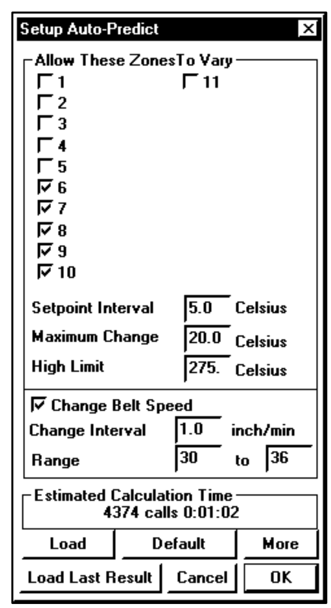
To use the Auto-Predict Tool, follow these steps:

- Display a profile. Either run a new profile or select one from the Event Browser.
- Ensure that the statistics for the recipe are correctly setup:
  - ✓ Select the statistics from the Setup Recipe dialog box that you will need to define the limits of your process specification.
  - ✓ Input the warning and/or alarm limits for at least one of the columns of statistics that you selected from the Setup Recipe dialog box.
- Select **Prediction** from the **Tools** list menu, press ALT+T+P, or select the  icon from the Toolbar. The standard **Prediction** dialog box will appear.
- Select the **Auto-Predict** button. The **Setup Auto-Predict** dialog box will appear.



The Auto-Predict tool looks for the combination of setpoints and conveyor speed that will make all the Statistics “green”. At the top of the Setup Auto-Predict menu are a series of check boxes which tell Auto-Predict which zones to vary.

The **Setpoint Interval** specifies how much to change the setpoint temperature for each new set of setpoints. The **Maximum Change** specifies how large of a change will be tested for each setpoint temperature.

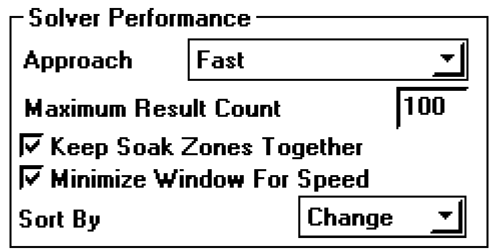


In the current example zones 7, 8, 9, and 10 will be changed. Each zone will set as much as 20 degrees higher and 20 degrees lower in 5 degree increments. The **High Limit** specifies that no setpoint will be set higher than 275.

The **Change Belt Speed** check box indicates that different conveyor speeds will be tested. The **Range** and **Change Interval** indicate that the speeds of 30, 31, 32, 33, 34, 35, and 36 will all be tested.

Near the bottom of this menu the **Estimated Calculation Time** is displayed. The more zones and the more belt speeds that are selected, the more potential solutions must be tried and thus the longer it will take to finish. Currently a maximum of 4,374 solutions will be tested taking approximately 1 minute and 2 seconds.

The **Load button** allows you to load a set of previously saved solutions. The **Load Last Result** button loads the most recent set of solutions.



The **More** button brings up the following menu:

Approach specifies how many combinations will be tested. In the **Fast** mode combinations that are not likely to result in a solution are skipped. In the **Exhaustive** mode, every combination is tested.

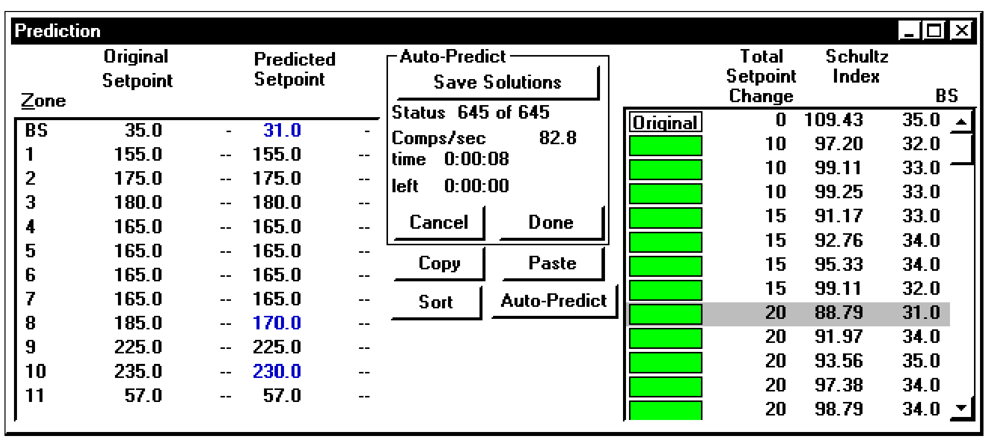
Maximum Result Count specifies the number of results that will be saved. The default value is 100, but if you are trying a large number of combinations, you may want to set this to 1000 or more.

Keep Soak Zones Together is a checkbox that minimizes the number of combinations that are tested. It does this by treating adjacent zones that start at the same temperature setpoint as one large zone (such as the "soak" zones).

When the **Minimize Window For Speed** checkbox is not checked, you can watch each prospective combination plotted on the graph.

Sort By specifies whether the solutions will be sorted by Setpoint Change or Schultz Index.

Pressing the **OK** button on the Setup-Auto Predict dialog box will start the Auto-Prediction. When it has finished, the **Prediction** dialog box will appear.

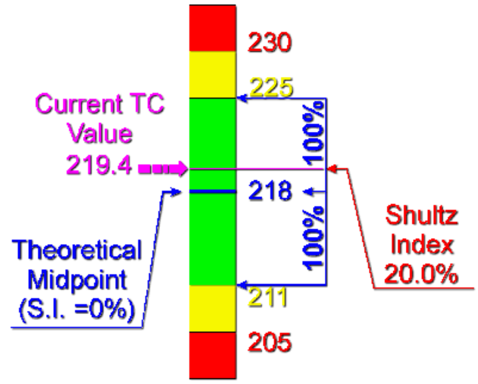


The left side of the **Prediction** dialog box shows two columns, the **Original Setpoints** and the **Predicted Setpoints**. Notice that each predicted setpoint that is different from the original is blue instead of black.

On the right side of the box, is a list of all the best solutions that were found. This contains four columns. The first column will be green if every statistic is green for that solution. It will be yellow if at least one statistic is yellow and red if at least one statistic is red.

The second column is titled **Setpoint Change** and shows the total setpoint change in degrees. The row that is highlighted has a setpoint change of 21. Looking at the left side of the box, you'll notice that zone 8 was lowered by 15 degrees and zone 10 was lowered by 5 degrees. for an absolute total setpoint change of 20 degrees.

The next column is titled **Schultz Index** and is a measure of how well the profile fits within the Statistics Limits and is instrumental in helping to discern which combination of zone setpoints will yield a group of statistics that tend to move about the theoretical midpoint of the warning and/or alarm limitations. Simply put, it



determines how well the profile data “fits” within your assigned Statistical Limit settings.

For the purposes of Auto-Predict, only the worst case (greatest) Schultz Index (SI) of all the Statistics Limits is shown. All others are simply less than this value.

The lower the number, the better the fit. A Schultz Index value of 99.99 is the highest value possible and still have all the Statistics green. A value below 90 indicates that this combination of oven setpoints and conveyor speed should bring the profile well within the specification.

The last column indicates the **Belt Speed** used in the solution.

In the example, the original combination of oven setpoints and conveyor speed gave us a profile with a Schultz Index value of 109.43 which was almost ten points above all the statistics being within specification.

The highlighted combination shows that if the conveyor speed was lowered by 4 inches/minute, zone 8 lowered by 15 degrees, and zone 10 lowered by 5 degrees, the expected Schultz Index value drops by over 20 points to 88.79 bringing all of our statistics well within the specification.

Selecting the **Save Solutions** button will save this set of solutions to an ASCII text file under a user defined name.

Alarms	Warnings	Good	Change	S.I.	Beltspeed	zones										
0	0	0	0	109.43	35	155	175	180	165	165	165	165	185	225	235	57
0	0	9	10	97.20	32	155	175	180	165	165	165	165	180	225	230	57
0	0	9	10	99.11	33	155	175	180	165	165	165	165	190	225	230	57
0	0	9	10	99.25	33	155	175	180	165	165	165	165	185	230	230	57
0	0	9	15	91.17	33	155	175	180	165	165	165	165	180	230	230	57
0	0	9	15	92.76	34	155	175	180	165	165	165	165	190	230	230	57
0	0	9	15	95.33	34	155	175	180	165	165	165	165	185	235	230	57
0	0	9	15	99.11	32	155	175	180	165	165	165	165	175	225	230	57
0	0	9	20	88.79	31	155	175	180	165	165	165	165	170	225	230	57
0	0	9	20	91.97	34	155	175	180	165	165	165	165	180	235	230	57
0	0	9	20	93.56	35	155	175	180	165	165	165	165	190	235	230	57
0	0	9	20	97.38	34	155	175	180	165	165	165	165	195	230	230	57
0	0	9	20	98.79	34	155	175	180	165	165	165	165	200	225	230	57
0	0	9	20	99.11	31	155	175	180	165	165	165	165	175	220	230	57
0	0	9	20	99.30	32	155	175	180	165	165	165	165	190	210	235	57
0	0	9	20	99.30	34	155	175	180	165	165	165	165	190	235	230	57
0	0	9	20	99.90	33	155	175	180	165	165	165	165	175	230	230	57

Example of the ASCII file output when Save Solutions is used.

The **Status** line shows that 645 combinations were tested. This example was run on a 200Mhz Pentium™ computer and the **Comps/Sec** shows that an average of 82.8 computations (combinations of oven setpoints and conveyor speed) per second were completed. **Time** shows the total time it took to finish computing.

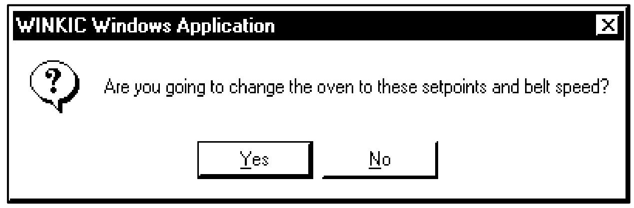
Note: This Auto-Prediction start with 4,374 possible combinations for testing and an estimated completion time of 1 minute and 2 seconds. The actual combinations tested was 645, with a completion time of 8 seconds.

*The reason for the difference is that the **Approach Method** selected was **Fast**. The KIC software ignored the remaining possibilities when it reached points during the*

Auto-Prediction process where it's logic determined that there were not likely to be any further solutions. The total number of solutions discovered was 51.

The **Copy** button copies the predicted setpoints to the Clipboard. This is useful if you are trying to find a combination of setpoints and conveyor speed that will work for two different boards. Simply copy the solutions to the Clipboard, and then run the Prediction Tool on the other profile and click on **Paste**.

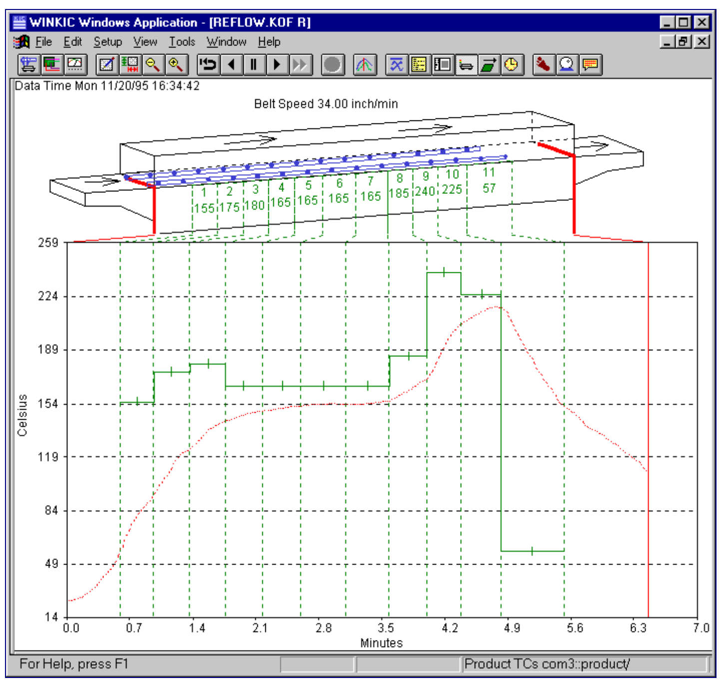
- Select the **Done** button to copy the selected solution to the current KIC Recipe. Clicking on **Auto-Predict** will startup the Auto-Predict tool again.



Select on the **Yes** button to save the changes.

Note: You must be sure to make these changes to your oven's zone setpoints and/or belt speed to achieve the predicted results.

A Guide Profile, representing thermocouple #1, will appear on the X/Y-graph. This guide profile will remain on the graph during the next profile allowing you to verify the accuracy of the prediction.



Perform a "verification" profile to test the predicted results. Again, use the combination of the statistics table and statistic limits to achieve the quickest results.

Virtual Profiling Tool

Virtual Profiling is a powerful feature that will vigilantly monitor your process 24 hours a day. To use this feature, you must have a set of KICprobes installed in your oven that will continuously monitor process temperature.

You must also have a SlimKIC or TC Extension to record the thermal profile of your product (baseline profile). When you create a Virtual Profile, the KIC software calculates the relationship between the baseline product profile and your process temperatures as measured by the KICprobes.

Once this relationship has been established, a virtual product profile is computed every time a new set of process temperatures are measured by the KICprobes. Virtual Profiling eliminates the need to run product profiles to verify the process, and can eliminate the defects caused by hidden process temperatures.

When a Board Sensor system (optional) is used, the belt speed is also measured in real-time and this value is used in lieu of the target belt speed (setup in the recipe) to calculate the Virtual Profile, which further improves the accuracy.

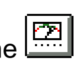
The accuracy of the Virtual Profile is reduced as the difference between the current and the baseline process temperatures increases. This difference is displayed as the “Average Deviation” or AD. You should check the product thermal profile if the AD gets “too high”.

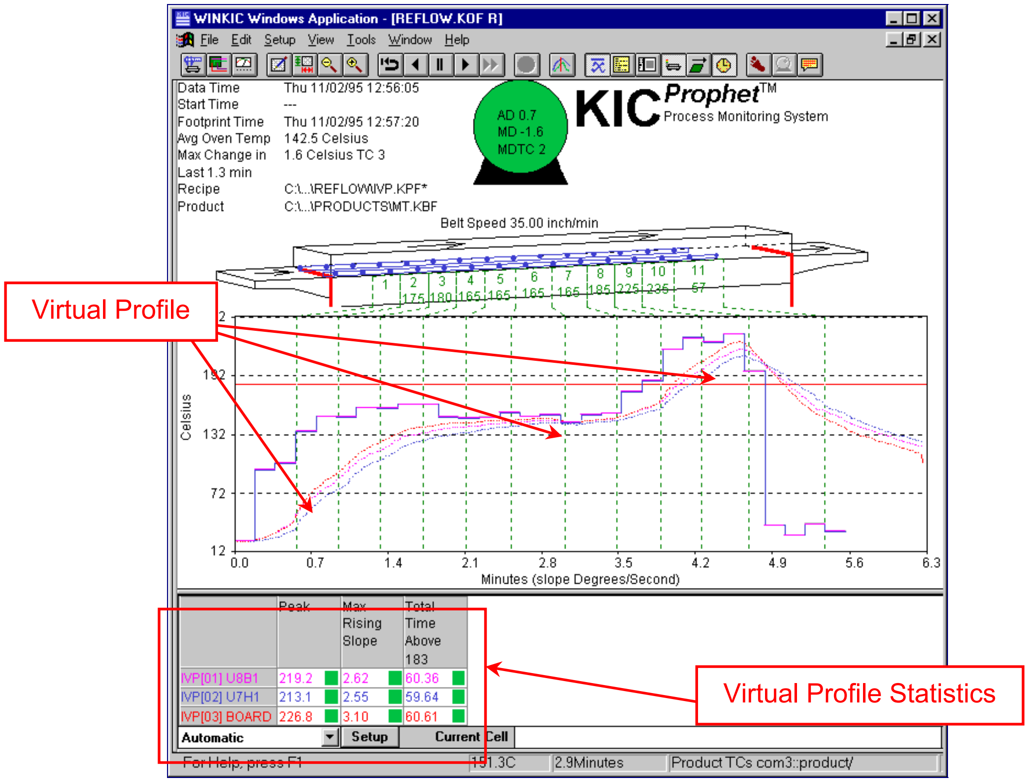
Because every process is different, you will need to determine what AD values are optimum for your process. Please contact KIC Thermal Profiling Technical Support if you have any questions.

Note: A Virtual Profile cannot be created from a Predicted Profile. This is tantamount to “simulating a simulation” and is not allowed.

CREATING A VIRTUAL PROFILE

To use the Virtual Profile feature, follow these steps:

- Run a new profile or load a profile from the Event Browser.
- Select **Recipe** from the **Setup** list menu, press ALT+S+R, or select the  icon from the Toolbar. The **Setup Recipe** dialog box will appear.
- Select **Virtual Profile** from the group list.
- Click on the **Create Virtual Profile** button.
  - ✓ A Virtual Profile will be created and displayed on the X/Y-graph in the form of dashed colored lines.
  - ✓ If the Statistics Table is selected for viewing, a new group of “Virtual” statistics will appear below the product profile statistics.
  - ✓ The **Virtual Profile AD/MD** and **Virtual Profile Bands** groups will appear in the **Setup Recipe** dialog box group list.



- Click on the **Save** or **Update History** button to save this Virtual Profile to the recipe.

  If this Virtual Profile was created from a profile selected from the Event Browser, use the **Apply Live** button to update the recipe used in the Live Mode with this new Virtual Profile.
- Click on the **OK** button to exit the **Setup Recipe** dialog box.

VIRTUAL PROFILE AD/MD LIMITS

When you ran a profile, the KIC software not only collected data from the product thermocouples, but also the KICprobe thermocouples as well. When a Virtual Profile is created, the KIC software establishes a correlation between what the product data and the KICprobe data. Once the KIC software has established this relationship, a “Virtual” profile can then be calculated using only the temperature data from the KICprobes.

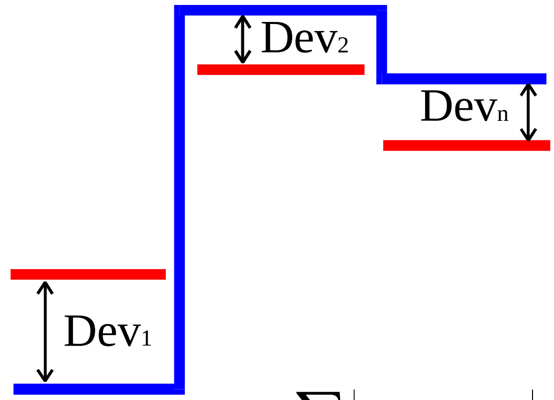
The KICprobes are essential in establishing and employing Virtual Profiling as a process tool. They allow the KIC software to constantly monitor the oven’s thermal condition.

The KIC software provides a software based alarm system that is linked to the Virtual Profile. The upper limits, lower limits, and even the use of the alarms themselves are each defined and setup by the user.

Since these values describe the limits of a Virtual Profile they can only be accessed and implemented after a Virtual Profile has successfully been created.

ABOUT AVERAGE AND MAXIMUM DEVIATION

In the KIC software, all references to "deviation" refer to the movement of the KICprobe temperature about the target temperature. With the AD and MD limit settings, you can setup the KIC software what Average and Maximum Deviations are permissible for your process.



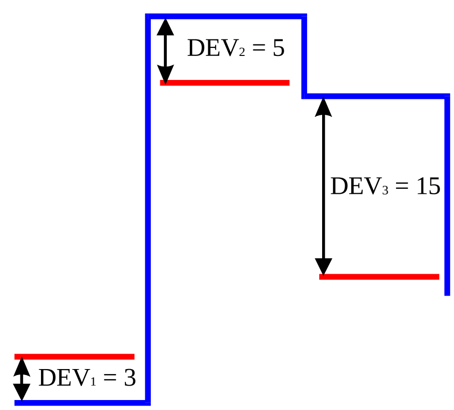
$$\frac{\sum |dev_n \bullet w_n|}{n}$$

Where:

w = Thermocouple Weight (assignable by the user)
n = Number of active KICprobe Thermocouples (assignable by the user)

The **Average Deviation** differs from the **Maximum Deviation** in that the average is taken for all the KICprobe deviation data, then the number is compared to the limit value(s) you've set.

But, what happens if one or more of the data deviates by such a large amount that the user should be warned by an alarm, but isn't because the data is leveled during averaging? This is where the Maximum Deviation limits comes in. Regardless of how stable the Average Deviation appears, if any one of the KICprobe temperature data meets or exceeds the Maximum Deviation limits, a separate alarm setting can ensure that you will be promptly notified.



Maximum Deviation = maximum of (Dev_1 , Dev_2 , Dev_3 , ...Dev_n)

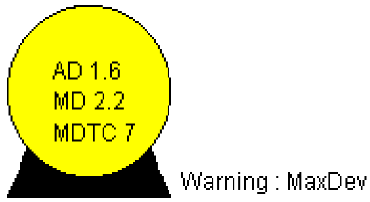
Maximum Deviation = 15 (considering just the deviations illustrated)

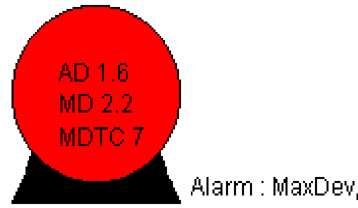
The red lines in the two diagrams represent what the KICprobe thermocouple values were at the start of the thermal profile. These red lines have now become the **KICprobe Targets**, or the point from which all the real-time KICprobe temperature data's deviation will be measured.

The Blue line represents the KICprobe real-time temperatures. The deviation is the difference between the KICprobe Targets (which do not move) and the KICprobe Real Time temperatures (which do move).

AD/MD ALARM STATES

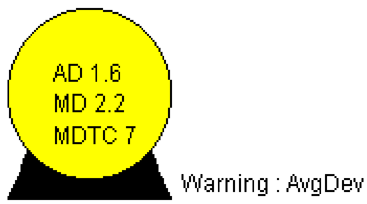
If any one of the KICprobe deviations meets or exceeds the Maximum Deviation Warning value, the crystal ball will turn yellow and a short explanation of what caused the condition will be displayed just to the lower right of the crystal ball.

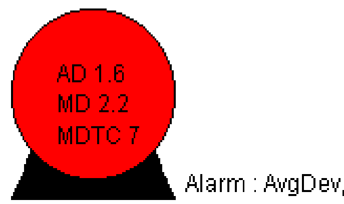




If any one of the KICprobe deviations meets or exceeds the MD Alarm value, the crystal ball will turn red and a short explanation of what caused the condition will be displayed just to the lower right of the crystal ball.

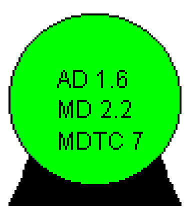
If the average of all the KICprobe deviations meet or exceed the AD Warning value, the crystal ball will turn yellow and a short explanation of what caused the conditions will be displayed just to the lower right of the crystal ball.





If the average of all the KICprobe deviations meet or exceed the AD Alarm value, the crystal ball will turn red and a short explanation of what caused the conditions will be displayed just to the lower right of the crystal ball.

When AD and/or MD are in use and the crystal ball is green, then this indicates that all the KICprobe deviations are within the values that you established the AD and/or MD.

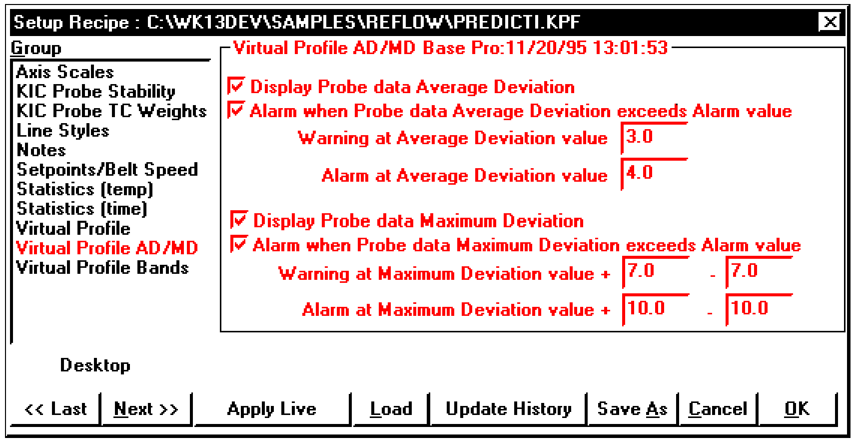


NOTE: The process oven must be ***capable*** *of maintaining the AD and MD within the limits you establish, otherwise the warnings and alarms will be frequent. If your oven is not capable of maintaining your limits, you should reevaluate your settings.*

SETTING UP THE AVERAGE & MAXIMUM DEVIATION

To setup the AD and MD, follow these steps:

- Select **Recipe** from the **Setup** list menu, press ALT+S+R, or select the  icon from the Toolbar. The **Setup Recipe** dialog box will appear.
- Select **Virtual Profile AD/MD** from the Group list.

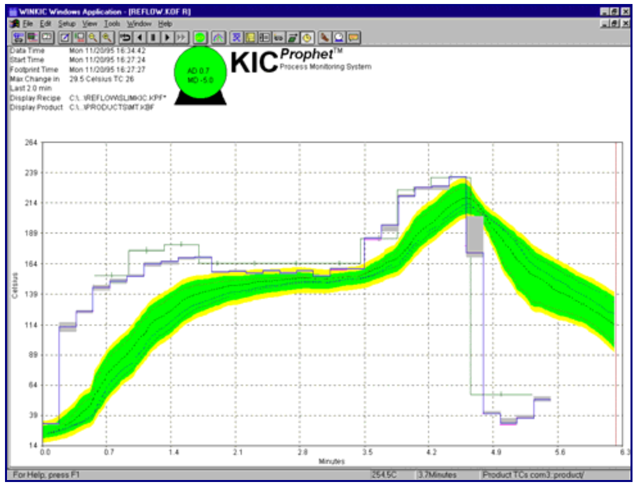


- To display the AD on the main screen, select the **Display KICprobe Data Average Deviation** checkbox.
- To activate the alarm (software, KIC Alarm Relay, or PLC Cable) when the AD exceeds the designated alarm value, select the **Alarm when KICprobe Data Average Deviation Reaches the Alarm Value** checkbox.
- Input the limitation the KIC software will use to determine when to issue a Warning condition for the AD in the **Warning at Average Deviation Value** field.
- Input the limitation the KIC software will use to determine when to issue an Alarm condition for the AD in the **Alarm at Average Deviation Value** field.
- To display the MD on the main screen, select the **Display KICprobe Data Maximum Deviation** checkbox.
- To activate the alarm (software, KIC Alarm Relay, or PLC Cable) when the MD exceeds the designated alarm value, select the **Alarm when KICprobe Data Maximum Deviation Reaches the Alarm Value** checkbox.
- Input the limitations the KIC software will use to determine when to issue a Warning condition for the MD in the **Warning at Maximum Deviation Value** fields.
- Input the limitations the KIC software will use to determine when to issue an Alarm condition for the MD in the **Alarm at Maximum Deviation Value** fields.

SETTING UP THE VIRTUAL PROFILE BANDS

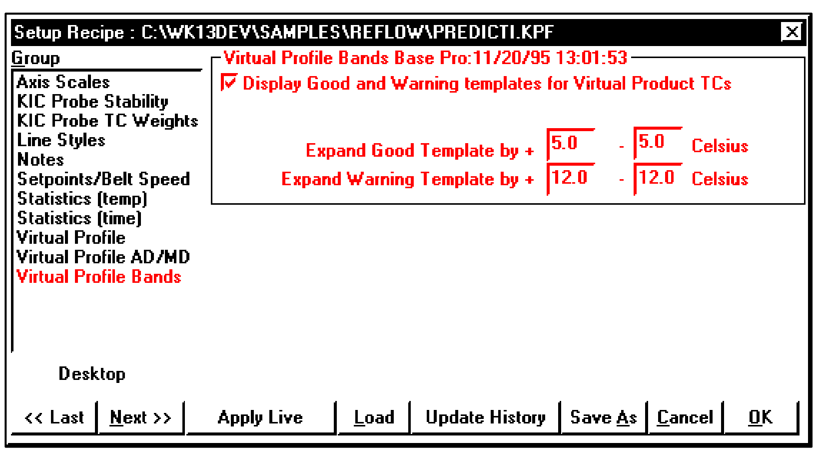
This group is only available for use if KICprobes are installed and a Virtual Profile has been created.

The Virtual Profile Bands, or templates, provide a means of visualizing a set of user defined limitations that envelope the Virtual Profile.



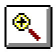
Note: You cannot set the alarm based on the Virtual Profile Bands.

- Select **Recipe** from the **Setup** list menu, press ALT+S+R, or select the icon from the Toolbar. The **Setup Recipe** dialog box will appear.
- Select **Virtual Profile Bands** from the Group list.
- To display the Virtual Profile Bands on the graph, select the **Display Good and Warning Templates for Virtual Product TCs** checkbox.
- To activate the alarm (software, KIC Alarm Relay, or PLC Cable) when the MD meets or exceeds the designated alarm value, select the **Alarm when KICprobe Data Maximum Deviation Reaches the Alarm Value** checkbox.
- Input the limitations the KIC software will use to define the exterior limit of the "good" area in the **Expand Good Template** fields.
- Input the limitations the KIC software will use to define the exterior limit of the "warning" area in the **Expand Warning Template** fields. The interior of the warning area is the exterior limit of the good area.

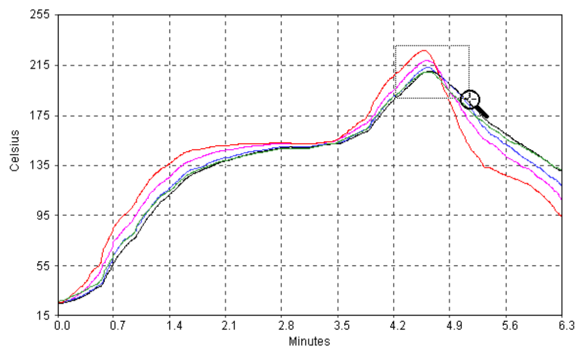


Screen Tools

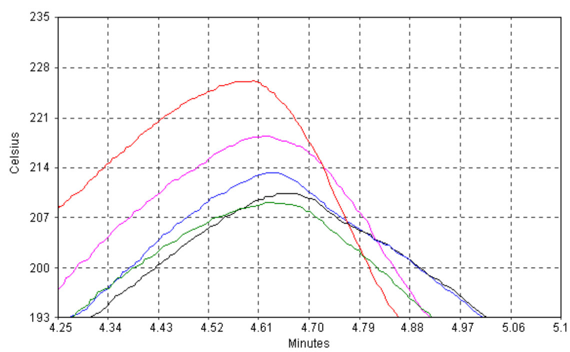
There are four basic tools for controlling the X/Y-graph:

-  Redraw – This is used to force a redraw of the X/Y-graph. This is used to help remove object remnants that may persist on some slower computers.
-  Auto-Scale – This is used to force re-scaling of the X/Y-graph to fit all viewable objects and data within the boundaries of the X/Y-graph display.
-  Zoom Out – This is used to undo each instance of the use of the Zoom In Tool in reverse sequence with which they were performed.
-  Zoom In – This is used to select and magnify an area of the graph.

To use the Zoom In Tool, place the mouse pointer at the upper left corner of the area of interest, then click and drag the mouse to the lower right corner.



Note: Whenever the mouse pointer is located anywhere within the graph region, the coordinates at the tip of the mouse pointer will appear on the Status Bar. Use this information to provide more control over the size of the selection box.



Data Tools

The Data Tools allow several methods of moving live and historical data with the KIC software as well as to other applications. Often times there may be a need to move the data outside it's native format to facilitate other types of analysis and/or control.

The Data Tools fall into 3 basic categories:

- **Copy/Paste** – This method utilizes the Windows Clipboard for moving data between the KIC software files as well as to other Windows based applications.
  - ✓ Product Profile data
  - ✓ Virtual Profile data
  - ✓ Profile Prediction data
  - ✓ KICprobe data
  - ✓ Statistics Table data
- **File Output** – This method is used to write live or historical data to a file on the local or network hard drive.
  - ✓ KIC Data File (.KDF)
  - ✓ PRF File (optional)
  - ✓ Log to Text File (optional)
  - ✓ Live Data Output, KIC Format (optional)
  - ✓ Live Data Output, QC-Calc Format (optional)
- **Serial Output** – This method exclusively sends live data to another computer by means of a serial interface.
  - ✓ Live Data Output, KIC Format (optional)

Copy Product TCs

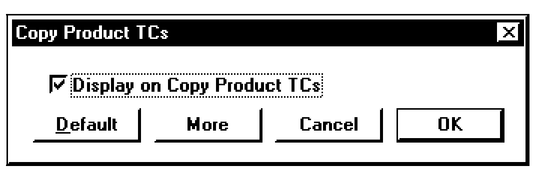
This option allows you to copy the profile temperature data from the KIC software X/Y-graph to the Windows Clipboard. Once the data is in the Windows Clipboard it can be pasted into another application that can facilitate custom analysis.

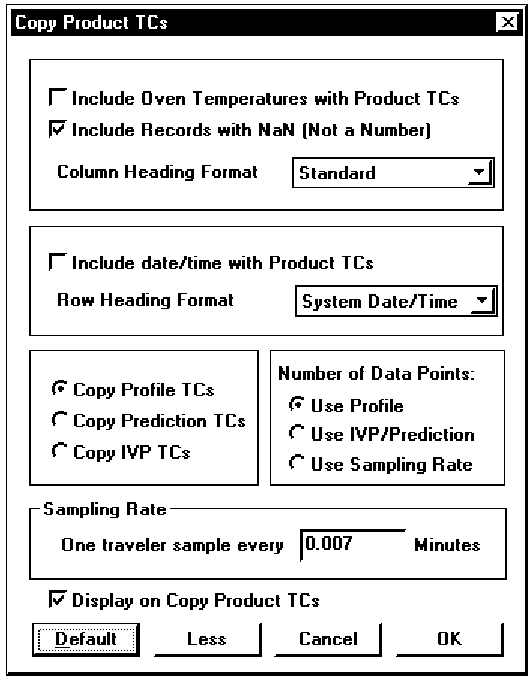
This option will be grayed out (unusable) if there are no profile data on X/Y-graph.

Note: The normal Windows convention of CTRL-C can be used to perform this function. This is quite useful if you will be performing this operation repeatedly.

- Choose **Copy Product TCs** from the edit list menu, press ALT+E+C, or press CTRL+C. The Copy Product TCs dialog box will appear.

  Notes: This dialog box has two views which can be alternated using the More and Less buttons.
- Make the appropriate options changes and select the OK button.





INCLUDE OVEN TEMPERATURES WITH PRODUCT TCS

Select this checkbox if you wish to include the corresponding KICprobe thermocouple temperature data along with the Product thermocouple temperature data. The default for this option is off, or unchecked.

Product_TC_Profile (Celsius/Minutes(bs=35.0))	1=U8B1	U8B1(Oven)	2=U7H1	U7H1(Oven)
0.000	24.7	33.5	25.2	115.2
0.011	24.8	33.5	25.4	115.2

Example of including oven temperatures along with the product thermocouples

INCLUDE RECORDS WITH NAN (NOT A NUMBER)

Select this checkbox if you wish to include records that contain no data. These records will be filled with the annotation **NaN**. Including null records is often times desirable because they represent part of the total quality of temperature readings taken. The default for this option is on, or checked.

Product_TC_Profile (Celsius/Minutes(bs=35.0))	1=U8B1	2=U7H1	3=BOARD	4=U4F1	5=U2G1
0.000	24.7	NaN	25.3	25.2	NaN
0.007	24.8	25.3	25.4	25.2	26.7

Example of records that do not contain information

COLUMN HEADING FORMAT

The column headings help to identify the location or source of a string of data. In the KIC software each column of data is associated with a single thermocouple. The default for this option is Standard.

This list menu contains two options for manipulating the column headings:

- **Standard** - The names assigned to the thermocouple locations in the Setup/Product dialog box will be used as the column headings.

Product_TC_Profile (Celsius/Minutes(bs=35.0))	1=U8B1	2=U7H1	3=BOARD	4=U4F1	5=U2G1
0.000	24.7	25.2	25.3	25.2	26.6
0.007	24.8	25.3	25.4	25.2	26.7

Example of data with standard heading information

- **None** - No record headings will be copied with the data.

0.000	24.7	25.2	25.3	25.2	26.6
0.007	24.8	25.3	25.4	25.2	26.7

Example of data without (none) heading information

INCLUDE DATE/TIME WITH PRODUCT TCS

Select this checkbox if you wish to include the computer's date/time stamp as the row headings. In the KIC software each row of data is associated with a point in time.

Normally, the row headings for copied data will consist of the X-axis scale data (either time or distance). Optionally, it is possible to include the computer's date/time stamp as the row headings in lieu of the X-axis scale data.

The date/time format is used is determined by which option is selected in the Row Heading Format list menu.

Note: The X-axis scale data is still included in the copied data. It will reside in the second column of data instead of the first column when this feature is selected.

The default for this option is off, or unchecked.

ROW HEADING FORMAT

This list menu contains a selection of date/time output formats used in conjunction with the Include Date/Time with Product TCs checkbox. The default for row headings is System Date/Time.

Six options for manipulating the row headings are available:

- **System Date/Time** - The format used will be **YY/MM/DD HH:MM:SS** and is the default.

Product_TC_Profile (Celsius/Minutes(bs=35.0))		1=U8B1	2=U7H1	3=BOARD	4=U4F1
11/20/95 16:27:24	0.000	24.7	25.2	25.3	25.2
11/20/95 16:27:24	0.008	24.8	25.3	25.4	25.2

Example of using System Date/Time row headings for the product TC output

- **YYMMDDHHMMSS** - No delimiters are used.

Product_TC_Profile (Celsius/Minutes(bs=35.0))		1=U8B1	2=U7H1	3=BOARD	4=U4F1
951120162724	0.000	24.7	25.2	25.3	25.2
951120162724	0.007	24.8	25.3	25.4	25.2

Example of using YYMMDDHHMMSS row headings for the product TC output

- **HHMMSS** - Date is not included.

Product_TC_Profile (Celsius/Minutes(bs=35.0))		1=U8B1	2=U7H1	3=BOARD	4=U4F1
162724	0.000	24.7	25.2	25.3	25.2
162724	0.007	24.8	25.3	25.4	25.2

Example of using HHMMSS row headings for the product TC output

- **Seconds from Start** - This is the accumulating number of seconds since the profile started.

Product_TC_Profile (Celsius/Minutes(bs=35.0))		1=U8B1	2=U7H1	3=BOARD	4=U4F1
816913644	0.000	24.7	25.2	25.3	25.2
816913644	0.007	24.8	25.3	25.4	25.2

Example of using Seconds from Start row headings for the product TC output. In the first records row heading, the seconds output is **816913644**. This equates to **11/20/95, 16:27:24**, or November 20, 1995 at 4:27:24PM.

- **Minutes from Start** - This is the accumulating number of minutes since the profile started.

Product_TC_Profile (Celsius/Minutes(bs=35.0))		1=U8B1	2=U7H1	3=BOARD	4=U4F1
13615227	0.000	24.7	25.2	25.3	25.2
13615227	0.007	24.8	25.3	25.4	25.2

Example of using Minutes from Start row headings for the product TC output. In the first records row heading, the minutes output is **13615227**. This equates to **11/20/95, 16:27:24**, or November 20, 1995 at 4:27:24PM.

- **None** - This option will output a null field for the date/time.

Product_TC_Profile (Celsius/Minutes(bs=35.0))		1=U8B1	2=U7H1	3=BOARD	4=U4F1
	0.000	24.7	25.2	25.3	25.2
	0.007	24.8	25.3	25.4	25.2

Example of using no row headings for the product TC output

COPY PROFILE TC'S

This option will copy all thermocouple data of the product profile currently displayed on the X/Y-graph.

Product_TC_Profile (Celsius/Minutes(bs=35.0))	1=U8B1	2=U7H1	3=BOARD	4=U4F1	5=U2G1
0.000	24.7	25.2	25.3	25.2	26.6
0.007	24.8	25.3	25.4	25.2	26.7

Example of the Copy Product TCs data format. Note that the column headings reflect the ascending order of the thermocouple number as well as the name assigned in the Setup/Product dialog box.

COPY PREDICTION TC'S

This option will copy all thermocouple data of a prediction currently displayed on the X/Y-graph. This option will be grayed out (unusable) if there are no Prediction data currently on the X/Y-graph.

Product_TC_Profile (Celsius/Minutes(bs=35.0))	1=Predicted[1]	2=Predicted[2]	3=Predicted[3]
0.000	24.7	25.2	25.3
0.010	24.8	25.4	25.4

Example of the Copy Prediction TCs data format.

COPY VIRTUAL PROFILE TC'S

This option will copy all temperature data for the Virtual Profile currently displayed on the X/Y-graph. This option will be grayed out (unusable) if there is not Virtual Profile data currently on the X/Y-graph.

Product_TC_Profile	1=IVP[1]	2=IVP[2]	3=IVP[3]	4=IVP[4]	5=IVP[5]
0.000	22.8	22.8	22.8	22.8	22.8
0.010	22.9	22.9	22.9	22.9	22.9

Example of the Copy Virtual Profile TCs data format.

NUMBER OF DATA POINTS

This option provides the ability to define the number of data points that are used when copying data.

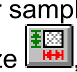
The sampling rates (i.e., the number of data points measured per thermocouple) for the Product thermocouples is set in the Setup/Oven/More/Sampling Rates dialog box by the user. The default is set to a maximum of 2000 data points per thermocouple. This default is adequate for most applications.

Virtual Profile (VP) and Predicted profiles use a standard of 500 data points per thermocouple. This is fixed and cannot be changed by the user.

Despite whichever type of profile is being copied, the data points can be sampled downward or interpolated upward as needed.

	Use Profile Method	Use Virtual/Predicted Method	Use Sampling Rate Method
Product Profile	All	Sampled	Interpolated or Sampled
Virtual Profile	Interpolated	All	Interpolated or Sampled
Predicted Profile	Interpolated	All	Interpolated or Sampled

The table above indicates how the data is handled depending on what type of profile is copied and which method is used.

Additionally, Only the data points that fall within the viewable region of the X/Y-graph will be copied, regardless of whether they are interpolated or sampled. The viewable area of the X/Y-graph can be manipulated using the Auto-size , Zoom-in  and Zoom-out  tools.

There are 3 options to choose from:

- **Use Profile**
  - ✓ If a product profile is selected for copying, all data points viewable on the X/Y-graph are copied directly to the Windows Clipboard.
  - ✓ If a Virtual Profile is selected for copying, the number of data points are first increased through interpolation to match the number of a product profile that would be viewable on the X/Y-graph, then copied to the Windows Clipboard.
  - ✓ If a Predicted profile is selected for copying, the number of data points are first increased through interpolation to match the number of a product profile that would be viewable on the X/Y-graph, then copied to the Windows Clipboard.
- **Use Virtual Profile/Prediction**
  - ✓ If a product profile is selected for copying, the number of data points viewable on the X/Y-graph are first sampled down to a maximum of 500, then copied to the Windows Clipboard.
  - ✓ If a Virtual Profile is selected for copying, all data points viewable (500 maximum) on the X/Y-graph are copied directly to the Windows Clipboard.
  - ✓ If a Predicted profile is selected for copying, all data points viewable (500 maximum) on the X/Y-graph are copied directly to the Windows Clipboard.
- **Use Sampling Rate** - This option allows the user to define a precise time interval to sample the data points on all thermocouples (see Sampling Rate). Depending

on the time interval (minutes) selected, data points from any profile type may be either interpolated or sampled as necessary.

SAMPLING RATE

Often referred to as *sampling frequency*, this option provides the user with the ability to select a discreet sample rate referenced in minutes.

Note: When Use Sampling Rate *is selected for the* Number of Data Points*, this option becomes active.*

The sampling rates input follows 3 basic rules:

- If the designated sampling frequency exceeds the overall length of the profile in reference to time, only the first and last data samples will be copied to the Windows Clipboard.
- If the designated sampling frequency exceeds that of the frequency originally used to collect the data, interpolation will be used to increase the raw data to the sampling frequency.
- The smallest number (highest frequency) allow for input is 0.0036 minutes. Any number smaller than this will result in a "Failed to set Clipboard data" message.

DISPLAY ON COPY PRODUCT TCS

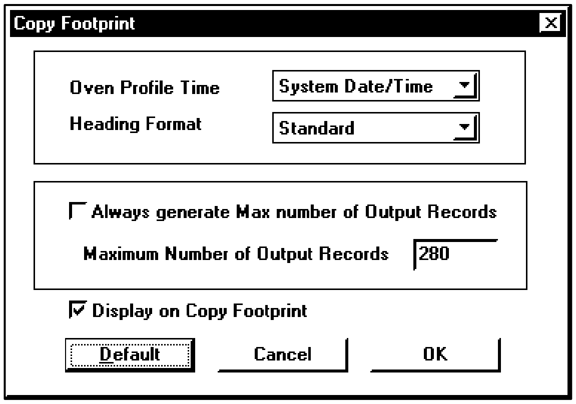
Select this checkbox to have the dialog box appear each time Copy Product TCs is selected. This feature duplicates the **Show Edit/Copy Product TCs, Copy Footprint Dialogs** checkbox in the Setup/Preferences dialog box.

The default for this option is on, or checked.

Copy Footprint

This option allows you to copy the accumulated KICprobe temperature data to the Windows Clipboard.

The row and column headings that are copied are dependent upon which type of axis scales are being used.



USING THIS OPTION

- Choose **Copy Footprint** from the edit list menu or press ALT+E+F. The Copy Footprint dialog box will appear.
- Make the appropriate options changes and select the OK button.

OVEN PROFILE TIME (ROW HEADINGS)

This list menu contains a selection of date/time output formats. The default for row headings is System Date/Time.

Six options are available for the row headings:

- **System Date/Time** - The format used will be **YY/MM/DD HH:MM:SS** and is the default.

OvenProfile	0.0	0.2	0.4	0.6	0.7	0.9
11/20/95 16:27	33.5	113.9	125.6	144.7	151.1	154.7
11/20/95 16:27	33.5	114.4	125.6	145.0	151.1	154.9
11/20/95 16:27	33.2	115.0	125.8	145.2	151.3	154.9
11/20/95 16:27	33.2	115.2	125.8	145.2	151.3	155.2

Example of using System Date/Time row headings for the footprint output

- **YYMMDDHHMMSS** - No delimiters are used.

OvenProfile	0.0	0.2	0.4	0.6	0.7	0.9
951120162727	33.5	113.9	125.6	144.7	151.1	154.7
951120162732	33.5	114.4	125.6	145.0	151.1	154.9
951120162737	33.2	115.0	125.8	145.2	151.3	154.9
951120162742	33.2	115.2	125.8	145.2	151.3	155.2

Example of using YYMMDDHHMMSS row headings for the footprint output

- **HHMMSS** - Date is not included.

OvenProfile	0.0	0.2	0.4	0.6	0.7	0.9
162727	33.5	113.9	125.6	144.7	151.1	154.7
162732	33.5	114.4	125.6	145.0	151.1	154.9
162737	33.2	115.0	125.8	145.2	151.3	154.9
162742	33.2	115.2	125.8	145.2	151.3	155.2

Example of using HHMMSS row headings for the footprint output

- **Seconds from Start** - This is the accumulating number of seconds since the profile started.

OvenProfile	0.0	0.2	0.4	0.6	0.7	0.9
0	33.5	113.9	125.6	144.7	151.1	154.7
5	33.5	114.4	125.6	145.0	151.1	154.9
10	33.2	115.0	125.8	145.2	151.3	154.9
15	33.2	115.2	125.8	145.2	151.3	155.2

Example of using Seconds from Start row headings for the footprint output

- **Minutes from Start** - This is the accumulating number of minutes since the profile started.

OvenProfile	0.0	0.2	0.4	0.6	0.7	0.9
0.00	33.5	113.9	125.6	144.7	151.1	154.7
0.08	33.5	114.4	125.6	145.0	151.1	154.9
0.17	33.2	115.0	125.8	145.2	151.3	154.9
0.25	33.2	115.2	125.8	145.2	151.3	155.2

Example of using Minutes from Start for the row headings for the footprint output

- **None** - This option will output a null field for the date/time.

OvenProfile	0.0	0.2	0.4	0.6	0.7	0.9
	33.5	113.9	125.6	144.7	151.1	154.7
	33.5	114.4	125.6	145.0	151.1	154.9
	33.2	115.0	125.8	145.2	151.3	154.9
	33.2	115.2	125.8	145.2	151.3	155.2

Example of using no row headings for the footprint output

HEADING FORMAT (COLUMN)

The column headings help to identify the location or source of a string of data. In the KIC software each column of data is associated with an individual KICprobe thermocouple. The default column heading format is Standard.

This list menu contains two options for manipulating the column headings:

- **Standard** - The distance or time as depicted on the currently selected X-axis label on the KIC software X/Y-graph will be used in the column headings or copied data to identify the KICprobe thermocouples.

OvenProfile	0.0	0.2	0.4	0.6	0.7	0.9
11/20/95 16:27	33.5	113.9	125.6	144.7	151.1	154.7
11/20/95 16:27	33.5	114.4	125.6	145.0	151.1	154.9
11/20/95 16:27	33.2	115.0	125.8	145.2	151.3	154.9
11/20/95 16:27	33.2	115.2	125.8	145.2	151.3	155.2

Example of the column heading format used for the footprint data when the selected X-axis scale in the KIC software is set for minutes. Considering the belt speed setup in the recipe, these headings reflect the "time" to each thermocouple on the KICprobe. In this example, the X-axis scale was set for minutes.

OvenProfile	0.0	6.5	13.0	19.5	26.0	32.5
11/20/95 16:27	33.5	113.9	125.6	144.7	151.1	154.7
11/20/95 16:27	33.5	114.4	125.6	145.0	151.1	154.9
11/20/95 16:27	33.2	115.0	125.8	145.2	151.3	154.9
11/20/95 16:27	33.2	115.2	125.8	145.2	151.3	155.2

Example of the column heading format used for the footprint data when the selected X-axis scale in the KIC software is set for distance and reflects the actual position of each of the KICprobe thermocouple locations as describe in the KIC software oven setup. In this example, the X-axis scale was set for inches.

- **None** - No record headings will be copied with the data.

11/20/95 16:27	33.5	113.9	125.6	144.7	151.1	154.7
11/20/95 16:27	33.5	114.4	125.6	145.0	151.1	154.9
11/20/95 16:27	33.2	115.0	125.8	145.2	151.3	154.9
11/20/95 16:27	33.2	115.2	125.8	145.2	151.3	155.2

Example of using no column headings with the footprint data.

ALWAYS GENERATE MAX NUMBER OF OUTPUT RECORDS

Select this checkbox to maximum the number to data records that are copied to the Windows Clipboard. Deselecting this checkbox provides access to the **Maximum Number of Output Records** option (below).

The default for this option is off, or unchecked.

MAXIMUM NUMBER OF OUTPUT RECORDS

This input field is used in conjunction with the **Always Generate Max Number of Output Records** checkbox (unchecked) and allows the user to define the absolute number of output records that are copied to the Windows Clipboard.

The default for this input field is 280 data records.

DISPLAY ON COPY FOOTPRINT

Select this checkbox to have the dialog box appear each time Copy Footprint is selected. This feature duplicates the **Show Edit/Copy Product TCs, Copy Footprint Dialogs** checkbox in the Setup/Preferences dialog box.

The default for this option is on, or checked.

Copy Stats

This option allows you to copy the data displayed on the Statistics Table to the Windows Clipboard. Once the data is in the Windows Clipboard it can be pasted into another application that can facilitate custom analysis. The Statistic Table row and column headings are included.

- Choose Copy Stats from the edit list menu or press ALT+E+S.
- Paste the information into another Windows application. The format will appear as shown in the example below.

	Peak	Max Rising Slope	Max Falling Slope	Total Time Above 183
1 U8B1	219.3	2.38	-1.96	59.95
2 U7H1	226.2	3.20	-4.49	52.24
3 BOARD	225.6	2.85	-3.05	58.60
4 U4F1	211.1	2.27	-1.57	61.60
5 U2G1	208.3	2.18	-1.86	50.48
TC Mean	218.1	2.58	-2.59	56.58
TC SD	8.2	0.43	1.20	4.92
TC Range	17.9	1.02	2.92	11.13

Example of Copy Stats data output format. The row headings (blue) and the column headings (red) are the same as that used in the Statistics Table headings.

Copy Brief

To access this feature, choose Copy Brief from the edit list menu or press ALT+E+B.

Copy KICprobe Status

This option allows you to copy a summary of the KICprobe Footprint data from the KIC software X/Y-graph to the Windows Clipboard. Once the data is in the Windows Clipboard it can be pasted into another application that can facilitate custom analysis.

The column headings contain the thermocouple numbers and the row headings contain the following:

- Current - the most current temperature reading at the time of the copy
- High - the highest temperature reading for the current Footprint
- Low - the lowest temperature reading for the current Footprint
- Delta - the difference between the highest and lowest temperature reading for the current Footprint. The value indicates the range of temperature movement for any particular thermocouple since the last time the Footprint was reset.

USING THIS OPTION

- Choose Copy KICprobe Status from the edit list menu or press ALT+E+K.
- Paste the information into another Windows application. When pasted, the format will appear as shown in the example below.

	TC 1	TC 2	TC 3	TC 4	TC 5	TC 6	TC 7
Low	28.6	106.9	123.3	142.0	148.6	154.1	163.0
High	31.3	118.2	126.6	146.3	152.2	156.0	165.5
Delta	2.7	11.3	3.3	4.4	3.6	1.9	2.5
Current	30.2	112.0	125.0	145.2	150.5	154.4	164.3

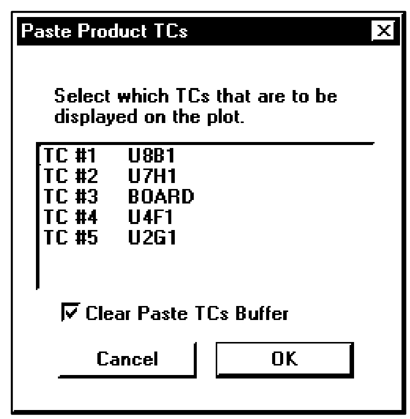
Example of Copy KICprobe Status data output format

To access this feature, choose **Copy KICprobe Status** from the Edit list menu or press ALT+E+K.

Paste Product TCS

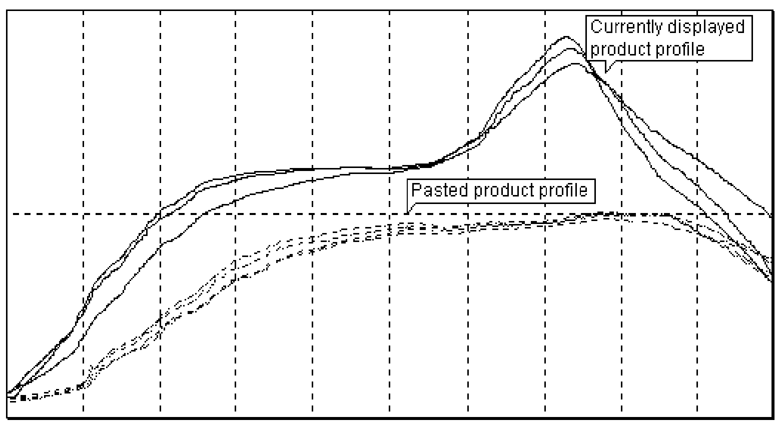
This option allows data placed into the Windows Clipboard using the Copy Product TCs option to be pasted back into the X/Y-graph of the KIC software. This ability allows you to “superimpose” one set of profile data atop another set of profile data for comparison studies.

Once pasted, a separate section of summary data will appear inside the Statistics Table that provides direct comparison of the two statistical data sets.



	Peak	Max Rising Slope	Max Falling Slope	Total Time Above
				183
1 U8B1	219.3	2.38	-1.96	59.95
2 U7H1	226.2	3.20	-4.49	52.24
3 BOARD	225.6	2.85	-3.05	58.60
4 U4F1	211.1	2.27	-1.57	61.60
5 U2G1	208.3	2.18	-1.86	50.48
TC Mean	218.1	2.58	-2.59	56.58
TC SD	8.2	0.43	1.20	4.92
TC Range	17.9	1.02	2.92	11.13
Paste 1 U8B1	219.5	2.79	-1.91	60.75
Paste 2 U7H1	213.2	2.62	-1.64	60.01
Paste 3 BOARD	227	3.17	-2.19	60.87
Paste Mean	219.9	2.86	-1.92	60.54
Paste SD	6.9	0.28	0.28	0.47
Paste Range	13.8	0.56	0.55	0.87

Viewing the pasted product TCs in the Statistic Table of the KIC software



View of pasted product profile. Note that two dissimilar product profiles are compared in this figure for the purposes of clarity.

To access this feature, choose **Paste Product TCs** from the edit list menu or press ALT+E+A.

Clear Paste List

This feature will clear all previously pasted thermocouple data from the X/Y-graph.

Note: This option is only available if pasted data exists on the X/Y-graph.

To access this feature, choose Clear Past List from the edit list menu or press ALT+E+L.

Copy Setpoints

This option allows you to copy the zone set points and belt-speed from those currently set on the oven's recipe.

To access this feature, choose Copy Setpoints from the edit list menu or press ALT+E+P.

Paste Setpoints

This option allows you to paste zone set-point and belt-speed data copied into the Windows Clipboard using the Copy Setpoints option into:

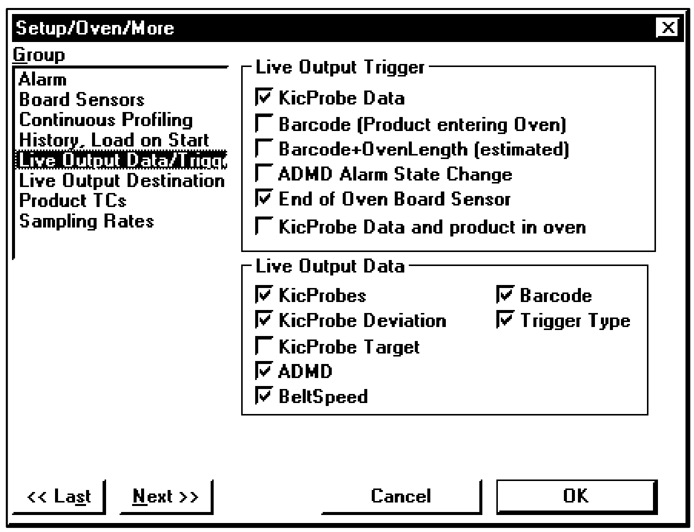
- A Windows based oven control software application that supports this features data format.
- Another KIC software oven file.

This capability provides easy transfer of set point data and eliminates the possibility of transposition errors should the data be input manually.

To access this feature, choose Paste Setpoints from the edit list menu or press ALT+E+T.

Live Output Data/Trigger Group (optional)

These options are associated with outputting the KIC software data in real-time to another application or file and are used in conjunction with the Live Output Destination group. This particular group allows you to select the output data strings as well as the trigger(s) that force the output to occur.



The use of this feature is dependent upon the use of the Prophet Thermal Manager system.

KICPROBE OUTPUT TRIGGER

The trigger is one or more reoccurring events that will cause the KIC software to output the data.

KICPROBE DATA

This event occurs each time the TPU is sampled for oven temperature data. This sampling frequency is defined in the Sampling Rates group.

The KICprobe Data trigger designation used with a standard KIC output format is **TKP**.

BARCODE (PRODUCT ENTERING OVEN)

This event occurs each time a barcode has been successfully scanned at the oven entrance. The use of barcode readers with the KIC software is a special feature which is not included with a standard Prophet Thermal Manager setup. For more information about this feature, please contact KIC Technical Support.

The Barcode (Product Entering Oven) trigger designation used with a standard KIC output format is **TOC.**

BARCODE+OVENLENGTH (ESTIMATED)

This event occurs each time a barcode has been successfully scanned at the oven entrance and the product has finished traversing the oven's length. The use of barcode readers with the KIC software is a special feature which is not included with a standard Prophet Thermal Manager setup. For more information about this feature, please contact KIC Technical Support.

The Barcode+Oven Length trigger designation used with a standard KIC output format is **TOE**.

ADMD ALARM STATE CHANGE

This event only occurs whenever a change in the KIC software's Alarm state occurs. Alarm state changes can occur by:

- The Average Deviation (AD) transits between a normal, warning or alarm condition in any direction.
- The Maximum Deviation (MD) transits between a normal, warning or alarm condition in any direction.

The Alarm State trigger designation used with a standard KIC output format is **TCHG**.

END OF OVEN PRODUCT SENSOR

This event occurs whenever the Board Sensor at the oven exit successfully detects the presence of a board. This trigger is intended to be implemented in conjunction with the Belt Speed output data and provides accurate measurements of the oven belt speed variations.

The use of Board Sensors with the KIC software is a special feature which is not included with a standard Prophet Thermal Manager setup. For more information about this feature, please contact KIC Technical Support.

The End of Oven Product Sensor trigger designation used with a standard KIC output format is **TBS**.

KICPROBE DATA AND PRODUCT IN OVEN

This event occurs each time the TPU is sampled for the oven temperature data and a board is known to be inside the oven, as detected by the Board Sensor at the oven entrance. This prevents superfluous data from being output when the oven is idle and the output temperatures have little or no bearing on the quality of the product.

The use of Board Sensors with the KIC software is a special feature which is not included with a standard Prophet Thermal Manger setup. For more information about this feature, please contact KIC Technical Support.

The KICprobe Data and Product in Oven designation used with a standard KIC output format is **TKP**.

LIVE OUTPUT DATA

There are one or more data types that can be output whenever the trigger(s) occur:

- KICprobes
- KICprobe Deviation
- KICprobe Target
- ADMD
- Belt Speed (optional)
- Barcode (optional)
- Data Trigger

KICPROBES

This data consists of all the raw thermocouple values of the KICprobes. There are no calculations or adjustments made to this data.

KICPROBE DEVIATION

This data consists of the individual deviation data for each KICprobe thermocouple. This field can only be used when a Virtual Profile has previously been created and is currently in use.

KICPROBE TARGET

This data consists of the individual KICprobe Target values, as established at the start of the product profile subsequently used to create the Virtual Profile. This field can only be used when a Virtual Profile has previously been created and is currently in use.

ADMD

This data consists of the Average and Maximum Deviation values as well as the identifier for the Maximum Deviation thermocouple. This field can only be used when a Virtual Profile has previously been created and is currently in use.

BELTSPEED

This data consists of the calculated belt speed measurement for the oven's entire length, as detected by the entrance and exit sensors of the Board Sensor system. This field is only available through the use of the Board Sensor option.

BARCODE

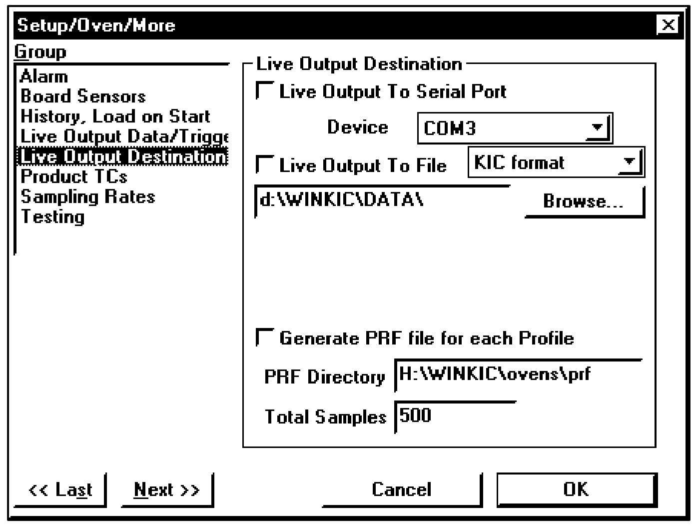
This data simply consists of the barcode number read directly off the products barcode label. This field is only available through the use of the Barcode Reader option. This data is "associative", or data used identify a specific record or record group, and not used as a direct measure.

TRIGGER TYPE

This is a "tag" or identifier that can additionally be output with other data that identifies which trigger event cause the output of that particular data to occur. This is most useful when employing two or more trigger types and you need to be able to segregate the output data by the events that caused the trigger. This data is "associative", or data used identify a specific record or record group, and not used as a direct measure.

Live Output Destination Group

These options are associated with outputting the KIC software data in real-time to another application or file and are used in conjunction with the Live Output Data/Trigger group. This group will provide a means of defining the directional flow of the output data.



LIVE OUTPUT TO SERIAL PORT

Select this checkbox to enable the data output via a serial (COM) port.

DEVICE

Used in conjunction with the Live Output to Serial Port checkbox, this list menu is used to define which discrete COM port the data will be sent out. The selections are COM ports 1 through 8 regardless of how many physical COM ports are actually setup on the computer.

LIVE OUTPUT TO FILE

Select this checkbox to have the data output written to an ASCII file.

KIC FORMAT

This is the default output file format. Each data set is written in one continuous data stream which constitutes a record. Carriage returns and line feeds delineate the end of one record and the start of the next.

This is a general output format that allows you to use or write other applications that can read and process this information.

By default a TAB delimitated format is used with the output data and cannot be changed. The following is a brief of some of the common output fields that the KIC software generates:

- The **date/time** field is controlled by the date/time output format found in the Copy dialog box or the Setup/Technical dialog box and include the following possibilities:
  - ✓ **Date/Time** – 11/20/95 16:27 Note: There exists a space between the date and time.
  - ✓ **YYMMDDHHMMSS** – 951120162727
  - ✓ **HHMMSS** – 162727
  - ✓ **Seconds from Start** – 816913644 (see note below)
  - ✓ **Minutes from Start** – 13615227 (see note below)

Note: The KIC Software measures time in seconds since midnight January 1, 1970. This time is resolved to the nearest millisecond.

- The **oven identifier** field contains the 8 characters of the oven's file name.
- The **temperature scale** field is controlled by the Y-axis scale reference in the Setup/Recipe dialog box and will be one of the following three designations:
  - ✓ **C** – Celsius (Centigrade)
  - ✓ **F** – Fahrenheit
  - ✓ **K** – Kelvin
- The **output trigger** field identifies what event caused the data to be output from the KIC software and may be one of the following five designations:
  - ✓ **TKP** – KICprobe sample was taken.
  - ✓ **TBC** – Barcode was read at the oven start area.
  - ✓ **TOE** – Barcode was read at the oven start and the product is now estimated to be at the oven exit area.
  - ✓ **TCHG** – Change in the KIC software's alarm state has occurred.
  - ✓ **TBS** – Board was detected by the Board Sensor at the oven exit area.
- The **associated string** field will typically contain the barcode number of the product when used. When no barcode reader is in use, this field will simply contain two dashes (i.e., "—").
- The **record type** field is a two to four character code that classifies the output record by identifying the source of the data:
  - ✓ **KP** – KICprobe record.
  - ✓ **KPD** – KICprobe Deviation record.
  - ✓ **KPT** – KICprobe Target values record.
  - ✓ **ADMD** – Average Deviation and Maximum Deviation record.
- The **data field** contains either raw temperature data from the KICprobe thermocouples, or calculated data such as the Average and Maximum Deviations.
- The following output fields are only associated with the ADMD outputs:
  - ✓ **MDTC** – Maximum Deviation Thermocouple is used to identify which of the KICprobe thermocouples reported the Maximum Deviation (MD). This field will contain an integer.
  - ✓ **Alarm State** – This field will contain an integer that is directly associated with the state of the KIC software's alarm:
    - ∗ 0 – Alarm Good. Associated with a "green" condition it means that the oven temperatures were within the user specified limitations and the process was in-control.

- ∗ 1 – Alarm Warning. Typically associated with a yellow alarm condition, this a warning that the user to take action to prevent an out-of-control condition from occurring in the process.
- ∗ 2 – Alarm Error. Associated with a red alarm, this condition indicates a process that has moved at or beyond the process limitations specified by the user and is out-of-control.

✓ **Alarm (verbose)** – This field simply contains the verbose version of the Alarm States described above.

- ∗ **Alarm Good**
- ∗ **Alarm Warning**
- ∗ **Alarm Error**

KICPROBES

When selected, all raw temperature data from the KICprobe thermocouples will be output.

Date/time	Oven Name	Temp Scale	Data Trigger	Barcode Number	Data Source	TC1 Value	TC2 Value	~	TC29 Value	TC30 Value
5/6/97 14:23	Oven 1	C	TKP	01B132	KP	24.7	24.7	~	23.9	23.1

KICprobe data output using the Standard KIC standard format. The headings in red are included to help clarify the data immediately beneath them and are NOT output.

KICPROBE DEVIATION

When selected, the deviations of each individual KICprobe thermocouple will be output. The deviations reference how far from the KICprobe Target (nominal value) the current thermocouple reading is.

Date/Time	Oven Name	Temp Scale	Data Trigger	Barcode Number	Data Source	TC1	TC2	~	TC29	TC30
5/6/97 15:24	Oven 1	C	TKP	--	KPD	0.2	-0.6	~	-0.5	0

KICprobe Deviation data output using the KIC standard format. The headings in red are included to help clarify the data immediately beneath them and are NOT output.

KICPROBE TARGET

This is a special application output record that reports the current target values for the KICprobe thermocouples. This output type provides little use as a repeating output since the data will only change if a new Virtual Profile was created or a different recipe was loaded. It's primary purpose is to report the KICprobe nominal values for applications that utilize and support custom defined calculations.

Date/Time	Oven Name	Temp Scale	Data Trigger	Barcode Number	Data Source	TC1	TC2	~	TC29	TC30
5/6/97 16:32	Oven 1	C	TKP	AF8764	KPT	25.8	25.1	~	23.9	23.7

KICprobe Target data output using the KIC standard format. The headings in red are included to help clarify the data immediately beneath them and are NOT output.

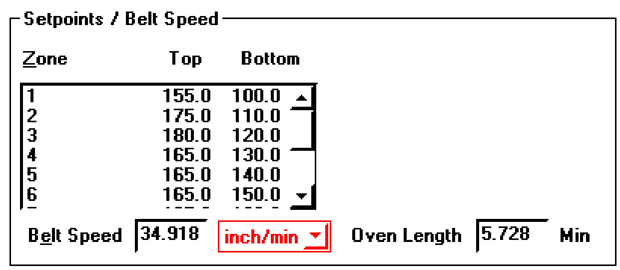
ADMD

With this option selected a record will be output that includes the Average Deviation, Maximum Deviation, the Maximum Deviation Thermocouple identification and the state of the KIC software Alarm in both code number and verbose.

Date/Time	Oven Name	Temp Scale	Data Trigger	Barcode Number	Data Source	Avg Dev	Max Dev	Max Dev TC	Alarm State	Alarm (verbose)
5/7/97 8:58	Oven 1	C	TKP	--	ADMD	2.4	-3	19	0	(Alarm Good)

ADMD data output using the KIC standard format. The headings in red are included to help clarify the data immediately beneath them and are NOT output.

BELT SPEED



The belt speed output record will contain information about the speed of the oven conveyor system as measure from the start Board Sensor to the end Board Sensor. Measuring the belt speed in this fashion offers the added advantage of accuracy because the velocity is measured over practically the entire distance of the oven's length.

The output belt speed value is expressed using whichever reference is currently selected in the **Setup Recipe** dialog box.

Date/Time	Oven Name	Temp Scale	Data Trigger	Barcode Number	Data Source	Belt Speed
5/7/97 9:44	ATMOS 14	C	TBS	83765	BS	35

Belt Speed data output using the KIC standard format. The headings in red are included to help clarify the data immediately beneath them and are NOT output.

QC-CALC FORMAT

(Refer to the QC-Calc for Windows user manual for information about the QC-Calc format.)

GENERATE PRF FILE FOR EACH PROFILE

Select this checkbox to create an ASCII file of product thermocouple data each time a profile is run. The KIC software will automatically create a new file for each profile using the DOS file extension of .PRF .

PRF DIRECTORY

Enter the directory path where the .PRF files will automatically be written to. This path can be either a local or network drive.

Note: If sending this information to a network drive, it must be shared.

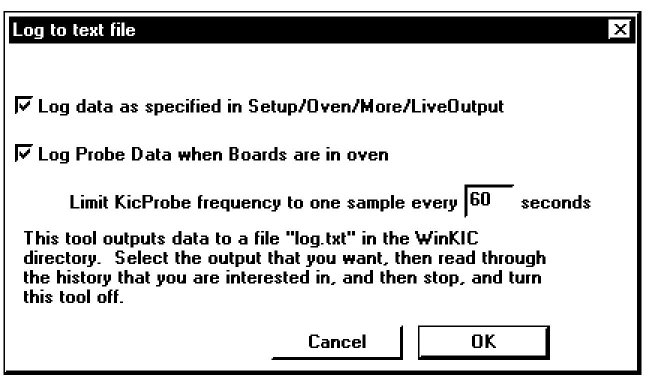
TOTAL SAMPLES

Input the total number of data samples that the .PRF file should contain for each thermocouple used. The KIC software will resample the total data samples taken to the sample quantity specified here. This ensures that the .PRF files contain like amounts of data samples that permit direct comparisons between files. The default is 500 samples.

LOG TO TEXT FILE

This feature provides the ability to collect user selected data from the history files by clicking on the event(s) of interest directly from within the Event Browser. It has both an ON and OFF state, as indicated by a check mark placed next to it on the Tools list menu when ON.

To access this feature, **Log to Text File** from the **Tools** list menu or press ALT+T+L. The Log to Text File dialog box will appear.



KIC SOFTWARE GUIDE

Overview of List Menu Options Summary

The list menus are located immediately below the Windows title bar and provide easy access to features of the Windows application. The items contained in each list menus are categorized by function.

Pressing the **ALT** key in combination with the underlined character on a menu item allows quick access through the keyboard.

*EXAMPLE: To open a file, hold down the ALT key and press F key to access the **File** list menu, then while continuing to hold down the ALT key, press the O key to **Open** a file.*

Note: The KIC software supports the use of "user levels" and passwords. When these features are employed, some of these list menu items may not appear on the screen depending on your assigned user level.

File (SUMMARY LIST)

- New Ctrl+N
- Open Ctrl+O
- Close
- Save As
- Print Ctrl+P
- Print Preview
- Page Setup
- Print Setup
- Logon
- Logoff
- Last 4 Recently Opened Files (1, 2, 3, 4)
- Exit

Edit (SUMMARY LIST)

- Copy Product TCs Ctrl+C
- Copy Footprint
- Copy Stats
- Copy Brief
- Copy KICprobe Status
- Paste Product TCs Ctrl+V
- Clear Paste List
- Copy Setpoints
- Paste Setpoints
- Comments

Setup (SUMMARY LIST)

- Hardware
- SlimKIC
- Download SlimKIC Data
- Profile Notes
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File

The file list menu contains items that are used to create, open, close, or print files. As a standard, the items found in this list menu conform to the standard Windows convention.

To access this menu, choose **File** from the list menu bar or press ALT+F.

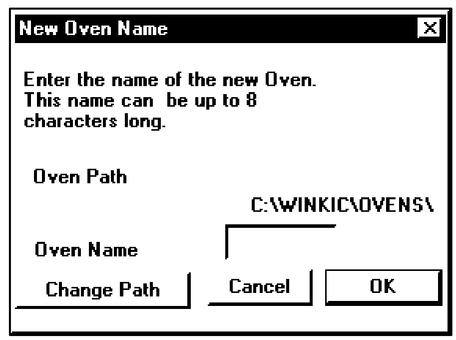
New

This option will allow you to create a new oven file. When selected, the **New Oven Name** dialog box will appear. Input the name of your oven (8 characters or less) and select the directory path name where this new oven file will be kept if you will not be using the KIC software default directory.

When you click on the OK button, the KIC software will automatically integrate this new file into the Event Browser database and present you with the Setup/Oven dialog box (see Setup menu).

USING THIS OPTION

- Choose **New** from the file list menu, press ALT+F+N, or press CTRL+N. The **New Oven Name** dialog box appears.
- Using 8 characters or less, input the name of the new oven and select the OK button. The KIC software will take a few seconds to add this new oven to the Event Browser database, then the **Setup/Oven** dialog box will appear.



Note: Refer to the Setup list menu section for further information about setting up a new oven.

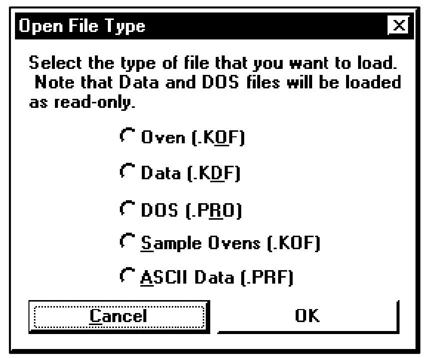
Open

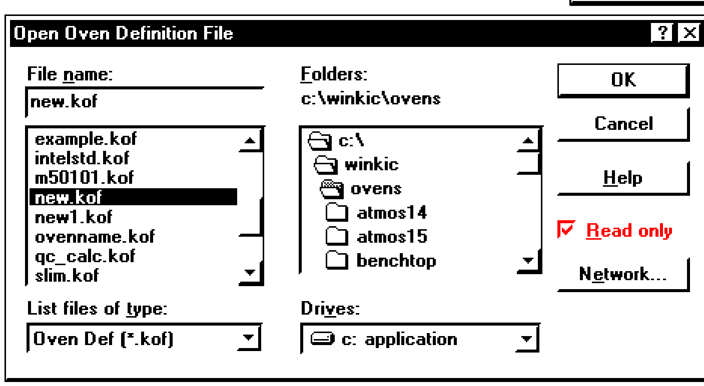
When selected, you will be presented with the **Open File Type** dialog box. This dialog box will allow you to open the following types of files:

- **Oven files** - Oven files use a DOS file extension of .KOF and, by default, are located in the WinKIC/Ovens sub-directory.
- **Data files** - Data files use a DOS file extension of .KDF and, by default, are located in the WinKIC/Data sub-directory.
- **DOS files** - DOS files use a file extension of .PRO .
- **Sample Oven files** - These samples are oven files (.KOF) used to demonstrate certain feature of the KIC software and, by default, are located in the WinKIC/Samples sub-directory.
- **ASCII Data files** - These files use a DOS extension of .PRF and are profile temperature data in raw ASCII data format.

USING THIS OPTION

- Choose Open from the file list menu, press ALT+F+O, or press CTRL+O. The **Open File Type** dialog box appears.
- Select which file type to open. The **Open Oven Definition File** dialog box appears.
- Select the specific file to open.





Note: If you are trying to open an Oven file as Read Only, select the Read Only checkbox in the Open Oven Definition File dialog box.

Close

This option is used to close whichever file type is currently in the Windows foreground. If you have any unsaved oven, product, or recipe information, you will be prompted to save each piece of unsaved information prior to the file being closed.

USING THIS OPTION

- Ensure that the file to close is in the foreground.
- Choose Close from the file list menu or press ALT+F+C.

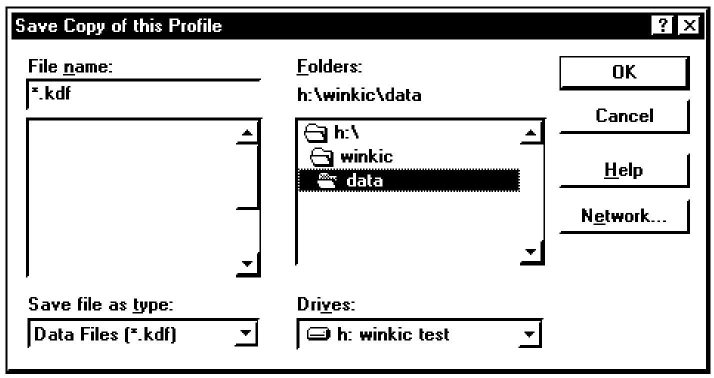
Save As

This option will generate a standalone data file (.KDF) of whatever is currently displayed on the screen. Information such as oven, product and recipe setups, profile data, statistical data, pointer data, etc., are written to a file that is typically small in size.

Note: Since this data file is associated with just the event currently displayed on the X/Y-graph, the information from the Event Browser is not applicable since it's list is associated with numerous events. For this reason, you'll find the Event Browser disabled when viewing a data file.

USING THIS OPTION

- Ensure that the file to save is in the foreground.
- Choose **Save As** from the file list menu or press ALT+F+A. The **Save As** file dialog box will appear and prompt for a name.



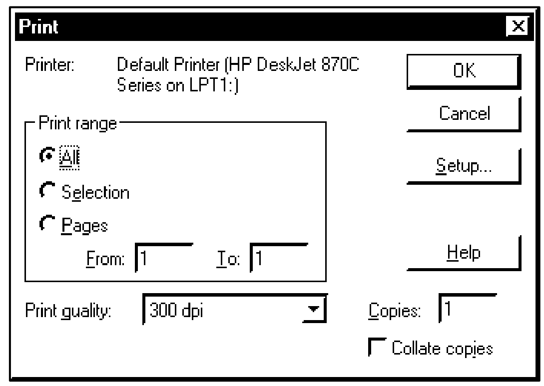
Print

This option adheres to the normal Windows convention of printing a document. When selected, the **Print** dialog box will appear. Depending on the type of printer and Windows driver version in use the **Print** dialog box may allow you to select further printing options.

Note: Not all printers, drivers and settings will yield the same print quality.

USING THIS OPTION

- Ensure that the file to print is in the foreground.
- Choose **Print** from the file list menu, press ALT+F+P, or press CTRL+P. The Print dialog box will appear.
- Modify the print options as appropriate and select OK.

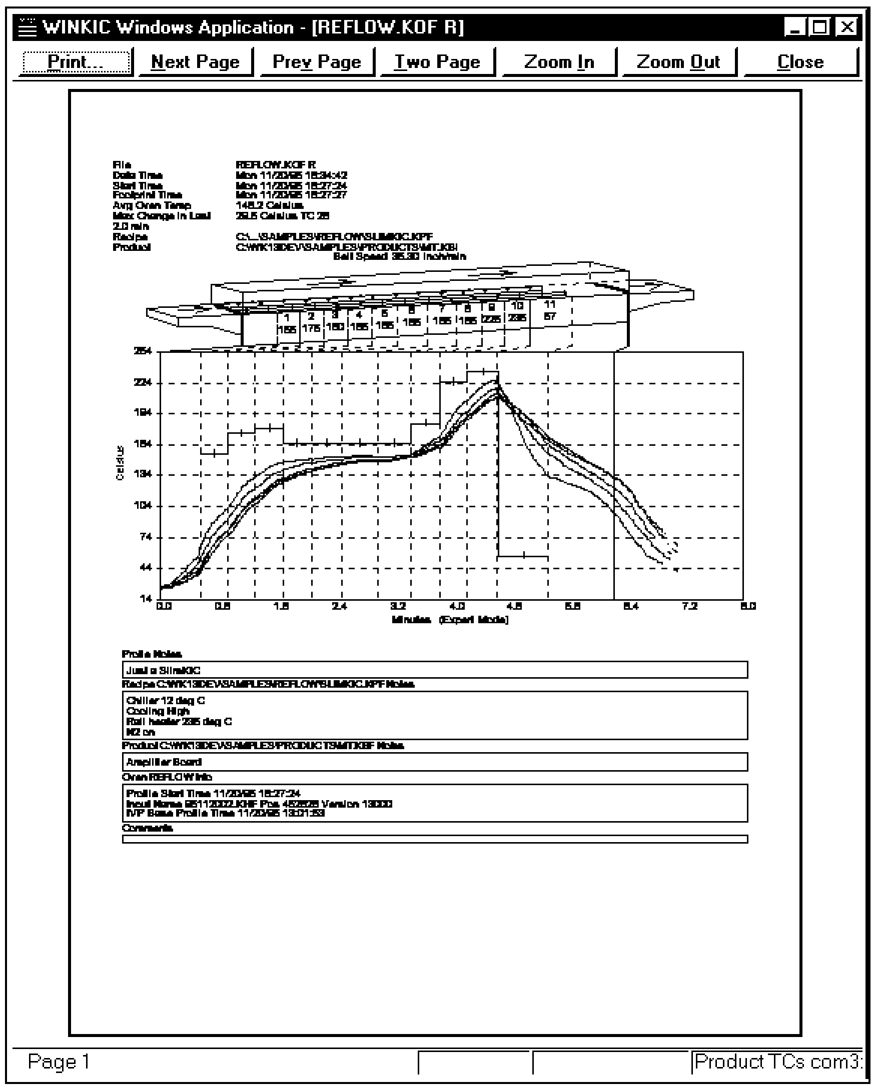


Print Preview

This option adheres to the normal Windows convention of print previewing and allows you to see how the printed page will appear prior to sending it to the printer. When selected, the normal KIC software screen becomes the **Print Preview** screen.

USING THIS OPTION

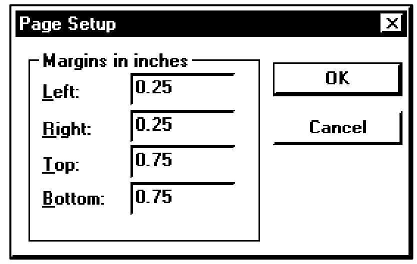
- Ensure that the file to preview is in the foreground.
- Choose **Print Preview** from the file list menu or press ALT+F+V. The main screen will be replaced with the print preview screen.
- Select the Print button to print, or the Close button to return to the main screen.



Page Setup

This option allows the page margins to be defined.

USING THIS OPTION

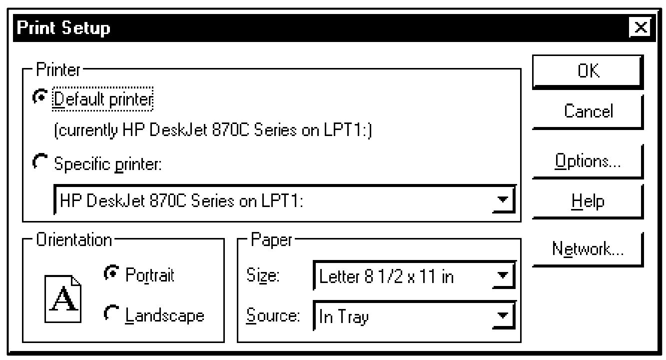


- Choose **Page Setup** from the file list menu or press ALT+F+G. When selected, the **Page Setup** dialog box will appear.
- Make any needed changed to the margins and select the **OK** button.

  Note: The margins can only be defined in inches.

Print Setup

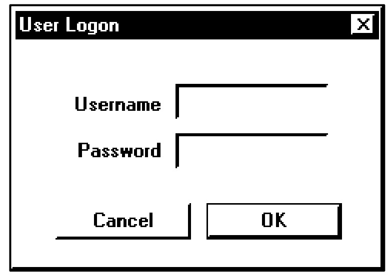
This option allows the printer and it's options to be defined. The KIC software can used printers across a network as well



USING THIS OPTION

- Choose **Print Setup** from the file list menu or press ALT+F+R. When selected, the **Print Setup** dialog box will appear.
- Select the printer and any appropriate options, then select the **OK** button.

Logon



When this feature appears on the File list menu, it indicates that the Privilege Level (password) mode has been enabled which will require a user name and password to use the KIC software beyond the View Only level.

When selected, the **User Logon** dialog box appears. This is a security feature that will only allow a person or group a finite set of privileges when operating the KIC software. Access to most of the KIC software features can restricted using this feature.

Note: Depending on the privileges provided by your Privilege Level, many of the KIC software's list menus, options on the list menus, and tools on the toolbar may be locked-out for your use.

USING THIS OPTION

- Choose **Logon** from the file list menu or press ALT+F+L. The **User Logon** dialog box will appear.
- Input your **Username** and **Password**, then select the **OK** button.

Logoff

When this feature appears on the File list menu, it indicates that the Privilege Level (password) mode has been enabled which will require a user name and password to use the KIC software beyond the View Only level.

This is a security feature that will allow you to log off the KIC software and deny other users your Privilege Level. When selected, a dialog box will appear informing you of the successful logoff.

USING THIS OPTION

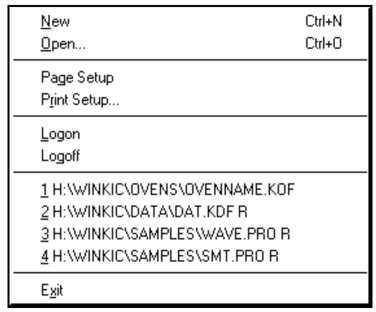
- Choose **Logoff** from the file list menu or press ALT+F+F. A message box will appear confirming the logoff

.

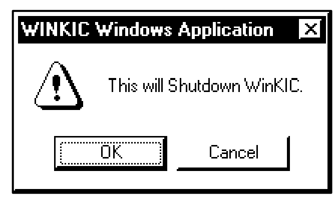
Last 4 Files Opened

This is a list of the last four files opened in the KIC software. These items will appear only after one or more files have been opened in the KIC software.

To access the most recent files, select them from the file list menu or press ALT+F+1, 2, 3, or 4.



Exit



Use this option to exit and close the KIC software application. All opened application files will be automatically closed unless there any oven, product or recipe setup changes that are unsaved, in which case you will be prompted to save these changes prior to the KIC software application closing.

To exit the KIC software, simply choose **Exit** from the file list menu or press ALT+F+X. A dialog box will appear requesting a confirmation of the action.

Select the **OK** button to exit the KIC software or Cancel. If you select Cancel, the KIC software and any currently opened oven files will continue running.

Edit

The edit list menu contains items that are used to perform copy/paste operations as well as edit data in the KIC software files. The Windows Clipboard is used when copying and pasting data between KIC files or to other Windows applications.

Note: The KIC Software measures time in seconds since midnight January 1, 1970. This time is resolved to the nearest millisecond.

To access this menu, choose **Edit** from the list menu bar or press ALT+E.

Copy Product TCS

This option allows you to copy the profile temperature data from the KIC software X/Y-graph to the Windows Clipboard. Once the data is in the Windows Clipboard it can be pasted into another application that can facilitate custom analysis.

This option will be grayed out (unusable) if there are no profile data on X/Y-graph.

Note: The normal Windows convention of CTRL-C can be used to perform this function. This is quite useful if you will be performing this operation repeatedly.

USING THIS OPTION

- Choose **Copy Product TCs** from the edit list menu, press ALT+E+C, or press CTRL+C. The **Copy Product TCs** dialog box will appear.

  Notes: This dialog box has two views which can be alternated using the More and Less buttons.
- Make the appropriate options changes and select the **OK** button.

INCLUDE OVEN TEMPERATURES WITH PRODUCT TCS

Select this checkbox if you wish to include the corresponding KICprobe thermocouple temperature data along with the Product thermocouple temperature data. The default for this option is off, or unchecked.

INCLUDE RECORDS WITH NAN (NOT A NUMBER)

Select this checkbox if you wish to include records that contain no data. These records will be filled with the annotation **NaN**. Including null records is often times desirable because they represent part of the total quality of temperature readings taken. The default for this option is on, or checked.

COLUMN HEADING FORMAT

The column headings help to identify the location or source of a string of data. In the KIC software each column of data is associated with a single thermocouple. The default for this option is Standard.

This list menu contains two options for manipulating the column headings:

- **Standard** - The names assigned to the thermocouple locations in the Setup/Product dialog box will be used as the column headings.
- **None** - No record headings will be copied with the data.

INCLUDE DATE/TIME WITH PRODUCT TCS

Select this checkbox if you wish to include the computer's date/time stamp as the row headings. In the KIC software each row of data is associated with a point in time.

Normally, the row headings for copied data will consist of the X-axis scale data (either time or distance). Optionally, it is possible to include the computer's date/time stamp as the row headings in lieu of the X-axis scale data.

The date/time format is used is determined by which option is selected in the Row Heading Format list menu.

Note: The X-axis scale data is still included in the copied data. It will reside in the second column of data instead of the first column when this feature is selected.

The default for this option is off, or unchecked.

ROW HEADING FORMAT

This list menu contains a selection of date/time output formats used in conjunction with the Include Date/Time with Product TCs checkbox. The default for row headings is System Date/Time.

Six options for manipulating the row headings are available:

- **System Date/Time** - The format used will be **YY/MM/DD HH:MM:SS** and is the default.
- **YYMMDDHHMMSS** - No delimiters are used.
- **HHMMSS** - Date is not included.
- **Seconds from Start** - This is the accumulating number of seconds since the profile started.
- **Minutes from Start** - This is the accumulating number of minutes since the profile started.
- **None** - This option will output a null field for the date/time.

COPY PROFILE TC'S

This option will copy all thermocouple data of the product profile currently displayed on the X/Y-graph.

COPY PREDICTION TC'S

This option will copy all thermocouple data of a prediction currently displayed on the X/Y-graph. This option will be grayed out (unusable) if there are no Prediction data currently on the X/Y-graph.

COPY VIRTUAL PROFILE TC'S

This option will copy all temperature data for the Virtual Profile currently displayed on the X/Y-graph. This option will be grayed out (unusable) if there is not Virtual Profile data currently on the X/Y-graph.

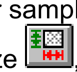
NUMBER OF DATA POINTS

This option provides the ability to define the number of data points that are used when copying data.

The sampling rates (i.e., the number of data points measured per thermocouple) for the Product thermocouples is set in the **Setup/Oven/More/Sampling Rates** dialog box by the user. The default is set to a maximum of 2000 data points per thermocouple. This default is adequate for most applications.

Virtual Profile (VP) and Predicted profiles use a standard of 500 data points per thermocouple. This is fixed and cannot be changed by the user.

Despite whichever type of profile is being copied, the data points can be sampled downward or interpolated upward as needed.

Additionally, Only the data points that fall within the viewable region of the X/Y-graph will be copied, regardless of whether they are interpolated or sampled. The viewable area of the X/Y-graph can be manipulated using the Auto-size , Zoom-in  and Zoom-out  tools.

There are 3 options to choose from:

- **Use Profile**
  - ✓ If a product profile is selected for copying, all data points viewable on the X/Y-graph are copied directly to the Windows Clipboard.
  - ✓ If a Virtual Profile is selected for copying, the number of data points are first increased through interpolation to match the number of a product profile that would be viewable on the X/Y-graph, then copied to the Windows Clipboard.
  - ✓ If a Predicted profile is selected for copying, the number of data points are first increased through interpolation to match the number of a product profile that would be viewable on the X/Y-graph, then copied to the Windows Clipboard.
- **Use Virtual Profile/Prediction**
  - ✓ If a product profile is selected for copying, the number of data points viewable on the X/Y-graph are first sampled down to a maximum of 500, then copied to the Windows Clipboard.
  - ✓ If a Virtual Profile is selected for copying, all data points viewable (500 maximum) on the X/Y-graph are copied directly to the Windows Clipboard.
  - ✓ If a Predicted profile is selected for copying, all data points viewable (500 maximum) on the X/Y-graph are copied directly to the Windows Clipboard.
- **Use Sampling Rate** - This option allows the user to define a precise time interval to sample the data points on all thermocouples (see Sampling Rate). Depending

on the time interval (minutes) selected, data points from any profile type may be either interpolated or sampled as necessary.

SAMPLING RATE

Often referred to as *sampling frequency*, this option provides the user with the ability to select a discreet sample rate referenced in minutes.

Note: When Use Sampling Rate *is selected for the* Number of Data Points*, this option becomes active.*

The sampling rates input follows 3 basic rules:

- If the designated sampling frequency exceeds the overall length of the profile in reference to time, only the first and last data samples will be copied to the Windows Clipboard.
- If the designated sampling frequency exceeds that of the frequency originally used to collect the data, interpolation will be used to increase the raw data to the sampling frequency.
- The smallest number (highest frequency) allow for input is 0.0036 minutes. Any number smaller than this will result in a “Failed to set Clipboard data” message.

DISPLAY ON COPY PRODUCT TCS

Select this checkbox to have the dialog box appear each time **Copy Product TCs** is selected. This feature duplicates the **Show Edit/Copy Product TCs, Copy Footprint Dialogs** checkbox in the **Global Preferences** dialog box.

The default for this option is on, or checked.

Copy Footprint

This option allows you to copy the accumulated KICprobe temperature data to the Windows Clipboard.

The row and column headings that are copied are dependent upon which type of axis scales are being used.

USING THIS OPTION

- Choose **Copy Footprint** from the edit list menu or press ALT+E+F. The **Copy Footprint** dialog box will appear.
- Make the appropriate options changes and select the **OK** button.

OVEN PROFILE TIME (ROW HEADINGS)

This list menu contains a selection of date/time output formats. The default for row headings is System Date/Time.

Six options are available for the row headings:

- **System Date/Time** - The format used will be **YY/MM/DD HH:MM:SS** and is the default.
- **YYMMDDHHMMSS** - No delimiters are used.
- **HHMMSS** - Date is not included.

- **Seconds from Start** - This is the accumulating number of seconds since the profile started.
- **Minutes from Start** - This is the accumulating number of minutes since the profile started.
- **None** - This option will output a null field for the date/time.

HEADING FORMAT (COLUMN)

The column headings help to identify the location or source of a string of data. In the KIC software each column of data is associated with an individual KICprobe thermocouple. The default column heading format is Standard.

This list menu contains two options for manipulating the column headings:

- **Standard** - The distance or time as depicted on the currently selected X-axis label on the KIC software X/Y-graph will be used in the column headings or copied data to identify the KICprobe thermocouples.
- **None** - No record headings will be copied with the data.

ALWAYS GENERATE MAX NUMBER OF OUTPUT RECORDS

Select this checkbox to maximum the number to data records that are copied to the Windows Clipboard. Deselecting this checkbox provides access to the **Maximum Number of Output Records** option.

The default for this option is off, or unchecked.

MAXIMUM NUMBER OF OUTPUT RECORDS

This input field is used in conjunction with the **Always Generate Max Number of Output Records** checkbox (unchecked) and allows the user to define the absolute number of output records that are copied to the Windows Clipboard.

The default for this input field is 280 data records.

DISPLAY ON COPY FOOTPRINT

Select this checkbox to have the dialog box appear each time Copy Footprint is selected. This feature duplicates the **Show Edit/Copy Product TCs, Copy Footprint Dialogs** checkbox in the **Global Preferences** dialog box.

The default for this option is on, or checked.

Copy Stats

This option allows you to copy the data displayed on the Statistics Table to the Windows Clipboard. Once the data is in the Windows Clipboard it can be pasted into another application that can facilitate custom analysis. The Statistic Table row and column headings are included.

USING THIS OPTION

- Choose Copy Stats from the edit list menu or press ALT+E+S.
- Paste the information into another Windows application.

Copy Brief

To access this feature, choose Copy Brief from the edit list menu or press ALT+E+B.

Copy KICprobe Status

This option allows you to copy a summary of the KICprobe Footprint data from the KIC software X/Y-graph to the Windows Clipboard. Once the data is in the Windows Clipboard it can be pasted into another application that can facilitate custom analysis.

The column headings contain the thermocouple numbers and the row headings contain the following:

- **Current** - the most current temperature reading at the time of the copy
- **High** - the highest temperature reading for the current Footprint
- **Low** - the lowest temperature reading for the current Footprint
- **Delta** - the difference between the highest and lowest temperature reading for the current Footprint. The value indicates the range of temperature movement for any particular thermocouple since the last time the Footprint was reset.

USING THIS OPTION

- Choose Copy KICprobe Status from the edit list menu or press ALT+E+K.
- Paste the information into another Windows application.

To access this feature, choose **Copy KICprobe Status** from the **Edit** list menu or press ALT+E+K.

Paste Product TCS

This option allows data placed into the Windows Clipboard using the Copy Product TCs option to be pasted back into the X/Y-graph of the KIC software. This ability allows you to “superimpose” one set of profile data atop another set of profile data for comparison studies.

Once pasted, a separate section of summary data will appear inside the Statistics Table that provides direct comparison of the two statistical data sets.

To access this feature, choose **Paste Product TCs** from the edit list menu or press ALT+E+A.

Clear Paste List

This feature will clear all previously pasted thermocouple data from the X/Y-graph.

Note: This option is only available if pasted data exists on the X/Y-graph.

To access this feature, choose **Clear Past List** from the edit list menu or press ALT+E+L.

Copy Setpoints

This option allows you to copy the zone set points and belt-speed from those currently set on the oven’s recipe.

To access this feature, choose **Copy Setpoints** from the edit list menu or press ALT+E+P.

Paste Setpoints

This option allows you to paste zone set-point and belt-speed data copied into the Windows Clipboard using the **Copy Setpoints** option into:

- A Windows based oven control software application that supports this features data format.
- Another KIC software oven file.

This capability provides easy transfer of set point data and eliminates the possibility of transposition errors should the data be input manually.

To access this feature, choose **Paste Setpoints** from the edit list menu or press ALT+E+T.

Comments

This option allows editing of Comments placed on the X/Y-graph. These Comments can be found listed in the Event Browser and are associated with a date and time.

USING THIS OPTION

- Choose **Edit Comments** from the edit list menu or press ALT+E+M. The Edit Comments dialog box appears.
- Select the comment you wish to edit from the list provided then select **OK**. The **Setup Comment** dialog box will appear.
- Make any needed changes to the comment and it's orientation on the X/Y-graph and select **OK**.

  Note: Use the delete button to remove the comment from the Event Browser.

Setup

The setup list menu contains items that are used to initially setup or edit the hardware and software features of the KIC software. Most of the items in this menu affect the behavior of the hardware inputs as well as the operation and look/feel of the software and should only be modified by a qualified person.

Note: Inappropriate changes to the items in the setup list menu can cause incorrect data outputs or render the KIC software application inoperative.

To access this menu, choose Setup from the list menu bar or press ALT+S.

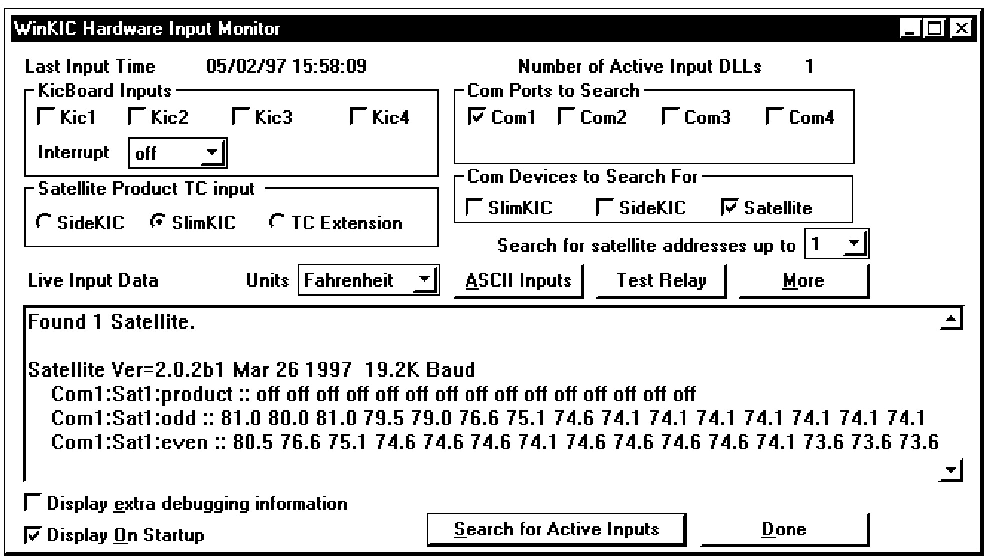
Hardware

This option provides access to the KIC software hardware setup. When selected, the **Hardware Input Monitor** dialog box will appear.

You use the Hardware Input Monitor for two purposes:

- Defining which KIC hardware is connected to your computer.
- Defining which communication ports the hardware is connected to.

To access this feature, choose Hardware from the setup list menu or press ALT+S+H.



LAST INPUT TIME

This is the computer based date and time when the last instance of live data was detected from a KIC device on one of the computer COM ports.

NUMBER OF ACTIVE DLL'S

This is the total number of hardware control Dynamic Link Libraries in use. One DLL will be opened for each type of KIC hardware selected in the **COM Devices to Search For** or **KICboard Input** areas. Additionally, another DLL will be opened for each ASCII INPUT device selected via the ASCII Input button.

Note: In order for a DLL to be correctly reflected in this count, a valid Interrupt must also be selected.

KICBOARD INPUTS

These check-boxes are only used if your computer has:

- A Quick-KIC Thermal Recorder installed.
- A set of KICboards installed.

One checkbox should be selected for each of these cards installed.

INTERRUPT

To correctly use these devices in Windows they must be set to communicate at the hardware interrupt level. Interrupts provide a means of allowing the hardware to preempt the computer CPU when it has work to perform.

This “software” interrupt setting must match that of the “hardware” interrupt setting in order to function correctly.

Note: If you are using a set of KICboards or a Quick-KIC Thermal Recorder card, only one of the cards need have it’s interrupt setup. The other card’s interrupt should remain in the OFF position.

COM PORTS TO SEARCH

This area allows you to select which computer COM port the KIC device(s) is connected to.

Up to eight COM ports may appear in this area, depending upon how many serial ports your computer is setup for.

Note: If other communication activity is detected on a COM port by the KIC software, this COM port will not appear. This is to prevent inadvertent selection of an active COM port.

COM DEVICES TO SEARCH FOR

This area is used to select which KIC devices that utilize COM ports are connected to the COM ports to search.

SLIMKIC

This checkbox should be enabled if a SlimKIC or SlimKIC-II Thermal Profiler is either:

- Directly connected to the COM port - This method is used to allow a SlimKIC Datalogger to saved data as well as to setup the SlimKIC Transmitter or Datalogger.
- Transmitting to a Thermal Receiver attached to the COM port - This method is only applicable to a SlimKIC or SlimKIC-II Thermal Profiler.

SIDEKIC

This checkbox should be enabled if a SideKIC Thermal Profiler is transmitting to a Thermal Receiver is attached to the COM port.

SATELLITE

This checkbox should be enabled if a TPU (Satellite) is connected to the COM port, regardless of whether you are using an RS-232 protocol (single TPU) or a KIClink protocol (two or more TPU's).

When enabled, the following other items appear on the Hardware Input Monitor dialog box:

- **Search for Satellite Addresses Up To** - This is a small list menu that allows you to define how many TPU's will be communicating through this COM. For a single TPU using an RS-232 protocol, the number selected should be always be 1. For a KIClink setup, select the total number of active TPU's on the KIClink network.
- **Satellite Product TC Input** - Select which device will be used as the method to collect the product profile temperature data through the TPU.
  - ✓ **SideKIC** - via a receiver attached to the TPU
  - ✓ **SlimKIC** - via a receiver attached to the TPU (default)
  - ✓ **TC Extension** - via trailing wires connected to the TPU's Traveler port.

UNITS

This list menu allows you to view the temperatures displayed within the Hardware Input Monitor in a temperature scale of your choosing. The scales available are:

- Kelvin
- Celsius (same as Centigrade)
- Centigrade (same as Celsius)
- Fahrenheit

LIVE INPUT DATA

This box reveals the Hardware Input Monitor status. The upper left corner of this box will indicate which devices were found, and how many were found. The body of this box will contain further information about the devices found, which COM port they were found on, and the live temperatures.

Note: The first time a SlimKIC Thermal Profiler is detected, subsequent searches without the SlimKIC present will still yield an active SlimKIC at the same baud rate it was last set at. This is to ensure that the KIC software will recognize the SlimKIC device for data downloading via the direct connect cable, regardless of when it is attached.

DISPLAY EXTRA DEBUGGING INFORMATION

When enabled, this feature will provide more detailed information about the devices found, such as ROM version and alarm status.

Furthermore, it will provide additional information as well as the current status about all possible COM ports available on the PC platform (COM1 through COM8).

DISPLAY ON STARTUP

This checkbox is enabled by default and will for the Hardware Input Monitor to appear automatically every time you start the KIC software.

Disabling this checkbox will prevent the Hardware Input Monitor from appearing each time you start the KIC software.

SEARCH FOR ACTIVE INPUTS BUTTON

Clicking on this button will close all inputs and search for the selected devices.

ASCII INPUTS BUTTON

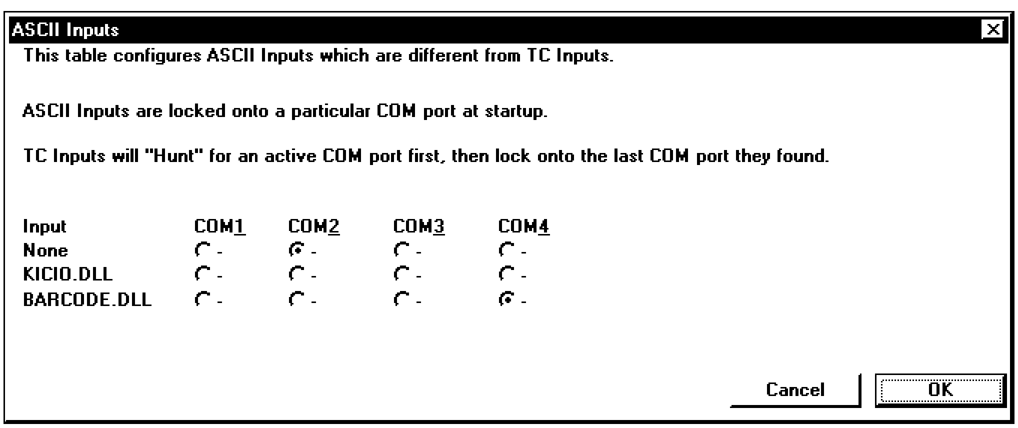
Clicking on this button will cause the **ASCII Inputs** dialog box to appear. The ASCII (**A**merican **S**tandard **C**ode for **I**nformation **I**nterchange) Inputs allows the add-on of other devices that can work in conjunction with the KIC system.

The dialog box presents a table of DLL's (Dynamic Link Libraries) that are used to provide support for additional support for other input hardware such as a KIC Alarm Relay used in conjunction with a Quick-KIC Thermal Recorder, KICboards, or a Barcode Reader.

Radio buttons are used to prevent enabling more than one type of device on the same COM port. If these hardware devices are not used, NONE must be selected.

Note: For each device selected in this dialog box (other than NONE) the Number of Active DLL's, located in the upper right-hand corner of the Hardware Input Monitor, will be increased accordingly. Additionally, the Live Input Data box will reflect this information.

DLL's selected on this dialog are loaded and locked onto the COM port that is selected. The automatic "hunt" for active devices is not performed using these DLL's.



ABOUT THE KICIO.DLL

This DLL is only used when a TPU is connected to the same computer that is also using the older style KICboards[19], and allows the use of a KIC Alarm Relay connected directly to the computer's COM port.

Do not select this option if you are not supporting this older configuration.

ABOUT THE BARCODE.DLL

This DLL is used to support standard barcode reading hardware from a dedicated COM port.

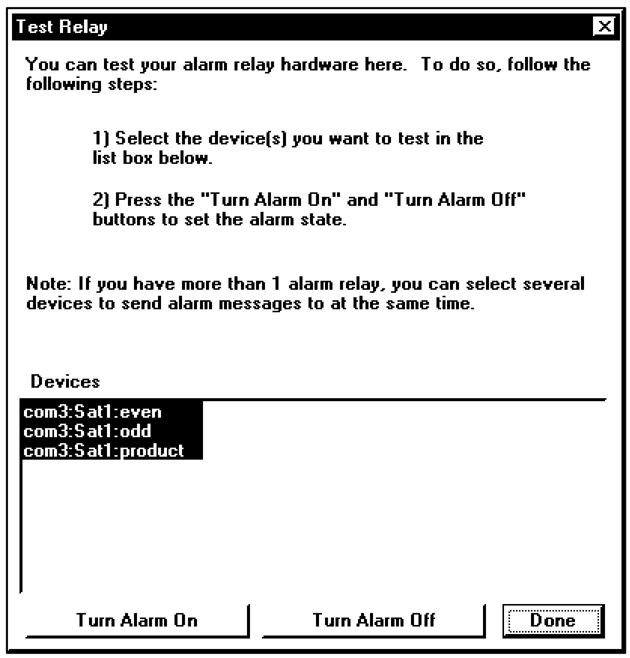
The software implementation of barcode readers is optional and is used to scan product barcodes and log this information on the Event Browser for quick access and examination at a later time, should the need arise.

If this option was not purchased, the Barcode.DLL option will not appear on the ASCII Inputs dialog box.

TEST RELAY BUTTON

Clicking on this button will cause the **Test Relay** dialog box to appear. This dialog box provides the technician or engineer a means of "forcing" a KIC Alarm Relay to an ON or OFF state. This feature is used to troubleshoot and diagnose hardware problems.

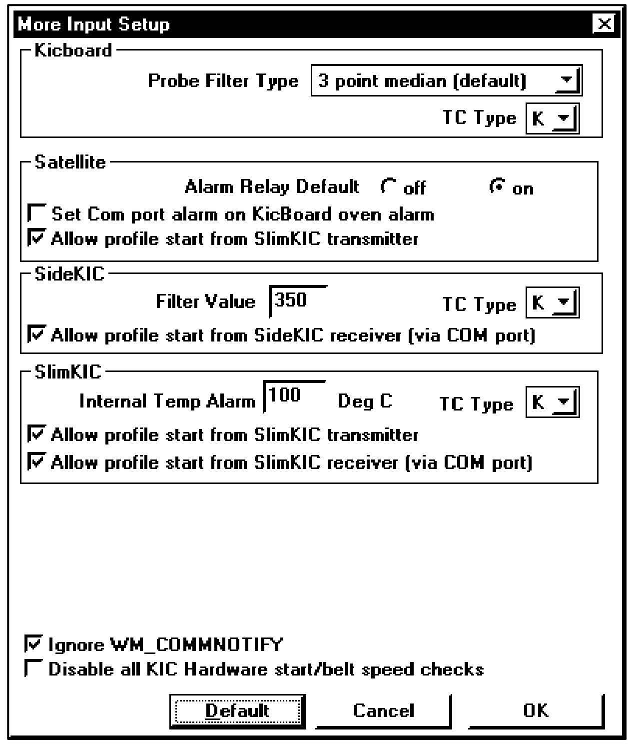
Note: If this feature is used while an oven file is open and has an alarm enabled, inaccurate results may occur. Therefore it is important to remember to close the oven files prior to diagnosing these hardware problems.



19 KICboards are no longer sold, but are still actively supported by KIC Technical Support.

MORE BUTTON

Clicking on this button will cause the **More Input Setup** dialog box to appear. This dialog box allows access to software switches that allow you to further define how a device should behave.



Note: Which devices appear in this dialog box solely depend upon which devices are selected in the Hardware Input Monitor dialog box.

The following devices appear in this dialog box:

- KICboard
- Satellite (TPU)
- SideKIC
- SlimKIC

KICBOARD

The following options are available for this device:

- **Probe Filter Type** - Use this list menu to select which data filter will be used. The choices are:
  - ✓ None
  - ✓ 3 Point Median (default)
  - ✓ 5 Point Median
- **TC Type** - Use this list menu to select which type of thermocouple is being utilized. The choices are:
  - ✓ **J** - Iron and Copper/Nickel elements
  - ✓ **K** - Chromel and Alumel elements (default)
  - ✓ **S** - Platinum(10%)/Rhodium and Platinum

SATELLITE

The following options are available for this device:

- **Alarm Relay Default** - These radio buttons allow control of the logic of the KIC Alarm Relay. The default is ON, which will cause the KIC Alarm Relay to switch-on when an alarm condition occurs. This operation can be inverted by enabling the OFF radio button.
- **Set COM Port Alarm on KICboard Oven Alarm** - When checked, this feature will allow an alarm condition on an oven attached to a KICboard to enable a KIC Alarm Relay on a COM port to activate.

Note: This option is only available if you have a TPU (Satellite) as well as a KICboard enabled in the Hardware Input Monitor dialog box simultaneously.

- **Allow Profile Start from the SlimKIC Transmitter** - Enabled by default, this feature allows the KIC software to start a profile queued from a start signal emitted from the SlimKIC Transmitter to a receiver attached to the TPU when the Start switch on the SlimKIC is pressed. Deselect this checkbox to disable the ability to start a profile from the SlimKIC.

SIDEKIC

The following options are available for this device:

- **TC Type** - Use this list menu to select which type of thermocouple is being utilized. The choices are:
  - ✓ **J** - Iron and Copper/Nickel elements
  - ✓ **K** - Chromel and Alumel elements (default)
  - ✓ **S** - Platinum(10%)/Rhodium and Platinum
- **Allow Profile Start from the SideKIC Receiver (via COM Port)** - Enabled by default, this feature allows the KIC software to start a profile queued from a hardware start signal on the receiver to a computer COM port. Deselect this checkbox to disable the ability to start a profile from the receiver connected to a COM port.

SLIMKIC OPTIONS

The following options are available for this device:

- **Internal Temp Alarm** - This input box allows you to increase or decrease of the SlimKIC maximum internal temperature alarm value in degrees Celsius. Whenever this value is reached or exceeded, the KIC software will display an Internal Temperature Alarm dialog box that appears on the computer monitor. Additionally, the KIC software will display an Internal Temperature Warning dialog box 20°C below the alarm setting.

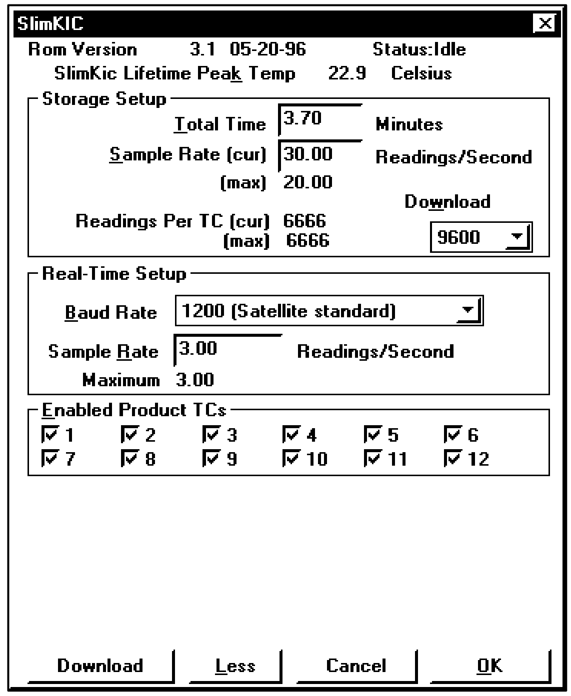
  The default value is 100°C and should normally never be changed without first consulting KIC Technical Support.
- **TC Type** - Use this list menu to select which type of thermocouple is being utilized. The choices are:
  - ✓ J - Iron and Copper/Nickel elements
  - ✓ K - Chromel and Alumel elements (default)
  - ✓ S - Platinum(10%)/Rhodium and Platinum
- **Allow Profile Start from the SlimKIC Transmitter** - Enabled by default, this feature allows the KIC software to start a profile queued from a start signal emitted from the SlimKIC Transmitter to a receiver attached to a computer COM port when the Start switch on the SlimKIC is pressed. Deselect this checkbox to disable the ability to start a profile from the SlimKIC.
- **Allow Profile Start from the SlimKIC Receiver (via COM Port)** - Enabled by default, this feature allows the KIC software to start a profile queued from a hardware start signal on the receiver to a computer COM port. Deselect this checkbox to disable the ability to start a profile from the receiver connected to a COM port.

DISABLE ALL KIC HARDWARE START/BELT SPEED CHECKS

This feature provides the capability to have the KIC software completely ignore all profile starts and belt-speed checks initiated from the KIC hardware.

This capability still allows these functions to be performed from either the main screen on the KIC software (start only) as well as from the computer keyboard (F2/start, F8/belt-speed check).

SlimKIC



This option provides access to the setup features of the SlimKIC and is only available when the SlimKIC is:

- Properly setup in the Hardware Input Monitor by selecting the **COM Devices to Search For** checkbox for the SlimKIC.
- Physically connected to the COM port using the Direct Connect cable (provided with all SlimKIC's).

When selected, the **SlimKIC** dialog box will appear.

This dialog box serves the following purposes:

- Modifying the data logging storage capabilities.
- Modifying the real-time capabilities.
- Enabling/Disabling thermocouples for use.
- Determining the hardware status of the SlimKIC.

To access this feature, choose **SlimKIC** from the setup list menu or press ALT+S+S.

MORE BUTTON (SLIMKIC)

The More button is used to view additional settings that are less used or changed. Clicking on the More button will cause the following information to appear inside the SlimKIC dialog box:

- SlimKIC PROM version
- The SlimKIC Lifetime Peak Temperature (in degrees Celsius) - This information is useful when attempting to determine the temperature extremes that the SlimKIC has been exposed to since it's use.
- Storage Setup/Download (baud rate)
- Real-Time Setup/Baud Rate
- The Default button converts to a Download button.

STORAGE SETUP

These features belong exclusively to the data logging capability and are generally modified to accommodate both the total time of the profile as well as the data sampling rate.

TOTAL TIME

The **Total Time** is used to define the limits of the profile duration. Normally the **Sample Rate** will follow the **Total Time** in priority. Should the application require it the **Sample Rate** can be prioritized before the **Total Time**.

Note: Total Time and Sample Rate are interrelated. If the Total Time is changed, the Sample Rate will be recalculated and vice-versa.

SAMPLE RATE (CUR)

The Sample Rate allows the user to define a discrete sample frequency at which the data will be collected. This value can never be greater than maximum sample rate (see below).

SAMPLE RATE (MAX)

The value in this field is automatically calculated by the KIC software and reveals the maximum frequency with which the SlimKIC is capable of collecting temperature data.

The limiting factors associated with this value are the Total Time (in minutes) and the total number of Enable Product TCs.

READINGS PER TC (CUR)

The value in this field is automatically calculated by the KIC software and reveals how many readings (total) per thermocouple the SlimKIC will achieve with the current settings. This value can never be greater than maximum readings per thermocouple (see below).

The limiting factors associated with this value are the Total Time (in minutes) and the Sample Rate (readings/second).

READINGS PER TC (MAX)

The value in this field is automatically calculated by the KIC software and reveals the maximum amount of data readings that can be achieved on each individual thermocouple.

The limiting factors associated with this value are the Total Time (in minutes) and the total number of Enable Product TCs.

REAL-TIME SETUP

The term “real-time” refers to the utilization of the SlimKIC whereas the data collected is immediately handed-off to the KIC software and processed.

The SlimKIC can be setup to collect data in real-time using one of two different methods:

- Radio Transmission – The SlimKIC transmits the data over a radio frequency that is collected by a radio receiver connected to either the computer COM port or the Receiver connector on a TPU.

- Direct Connect – The SlimKIC sends the data through a cable that physically connects the SlimKIC to the computer COM port. This is the same cable used to modify the internal settings of the SlimKIC.

BAUD RATE

This option allows the selection of the baud rate used to throughput data in real-time. The Baud Rate list menu can only be viewed by selecting the More button at the bottom of the SlimKIC dialog box.

The baud rates available are:

- 1200 (Satellite Standard) – This is the default setting for the SlimKIC. This setting must be used when transmitting real-time data to a receiver attached to a TPU.

- 2400 (Radio Fast) – When using a receiver connected directly to a COM port on the computer, this setting may be used.

SAMPLE RATE

The Sample Rate allows the user to define a discrete sample frequency at which the data will be throughput. This value can never be greater than the Maximum (see below).

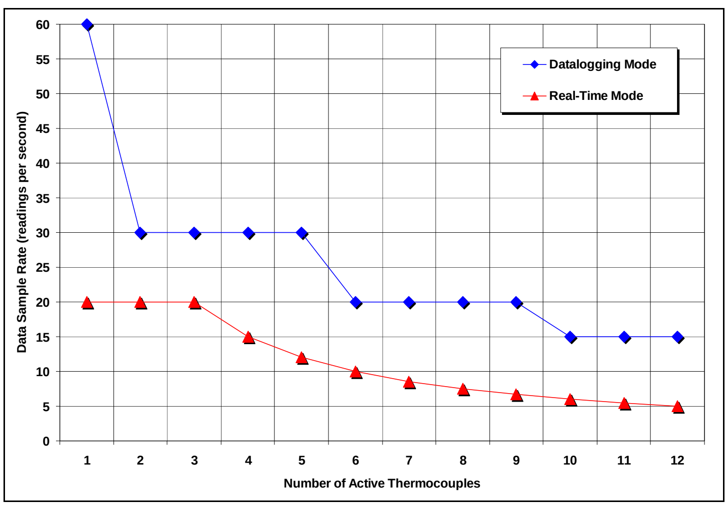
MAXIMUM

The value in this field is automatically calculated by the KIC software and reveals the maximum frequency with which the SlimKIC is capable of collecting and sending data in real-time.

The limiting factors associated with this value are the baud rate and the total number of Enable Product TCs.

ENABLED PRODUCT TCs

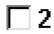
These 12 checkboxes provide a means of discretely activating or deactivating thermocouples for use. The greater the number of thermocouples active, the fewer the number of data samples that can be taken.



This chart depicts the thermocouple sampling frequencies possible with different numbers of thermocouples enabled. Both Data-logging and Real-time modes are plotted.

Below are examples of the three possible states of product thermocouples in the SlimKIC dialog box:

-  - This is an example of the second thermocouple enabled for use and is also the default of all active thermocouples.

-  - This is an example of the second thermocouple disabled for use.

-  - This is an example of the second thermocouple in an inactive state. This state can only be changed by KIC Thermal Profiling. Please contact KIC Technical Support for further information about expanding the capabilities of your SlimKIC.

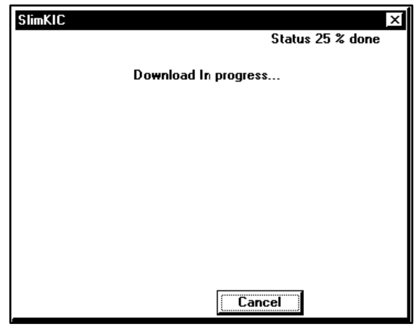
Note: Thermocouple #1 cannot be disabled.

DOWNLOAD BUTTON

This button allows the user to force a download directly from the SlimKIC Setup dialog box. When selected, the SlimKIC will begin a normal download at the baud rate selected in the Storage Setup options.

This option will appear in place of the Default button only after the More button is selected.

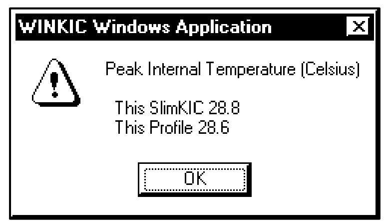
Download SlimKIC Data



When selected, this option immediately initiates a data download from the SlimKIC. The status of the download is represented in percentage of the download completed and is displayed in the upper right corner of the SlimKIC dialog box.

Once the download is completed, a dialog box will appear that reveals two critical pieces of information:

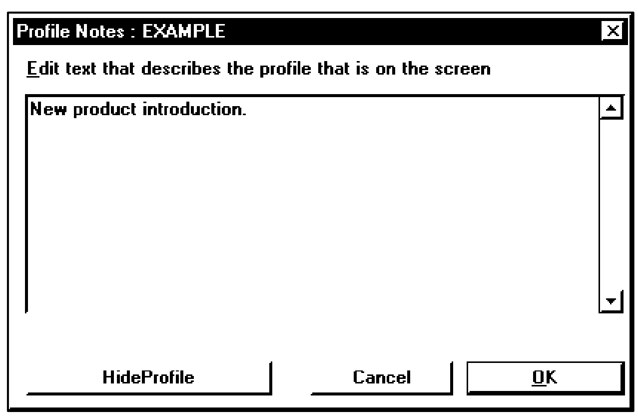
- **Peak Internal Temperature for the SlimKIC** – This is the "lifetime" peak internal temperature of the SlimKIC. This is the highest temperature that the inside of the SlimKIC has ever endured. This temperature should never exceed 100ºC, however, in the unlikely event that it does, you should forgo further use of the SlimKIC and contact KIC Technical Support.



- **Peak Internal Temperature of the Profile** – This is the peak internal temperature of the SlimKIC for the profile just completed.

To access this feature, choose **Download SlimKIC Data** from the setup list menu or press ALT+S+D.

Profile Notes



This option will provide a means of editing any notes associated with a profile and is only available for use when a profile event is displayed on the X/Y-graph.

By default, this Profile Notes dialog box automatically appears whenever a profile is started, either manually or triggered by the oven entrance Board Sensor (optional). However, it can be prevented from automatically appearing by deselecting the **Show Edit Profile Notes on Profile Start** checkbox in the **Global Preferences** dialog box.

The first text line of the **Profile Notes** dialog box will appear next to the corresponding profile on the Event Browser.

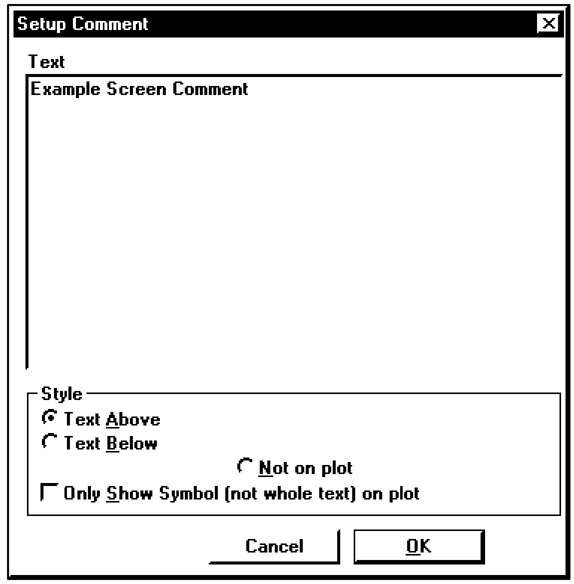
USING THIS OPTION

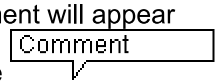
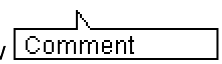
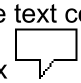
- Choose **Profile Notes** from the setup list menu or press ALT+S+N. The **Profile Notes** dialog box appears.
- Edit the text and select the OK button.

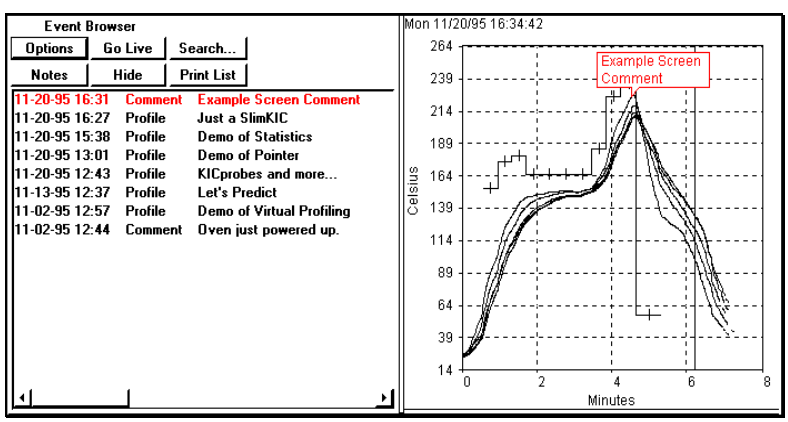
Screen Comments

This option will provide a means of associating comments with a particular time and date in the Event Browser.

USING THIS OPTION



- Choose **Screen Comments** from the setup list menu or press ALT+S+M. **The Setup Comment** dialog box appears.
- Input the text of your comment.
- Select the fashion with which you would like this comment to appear in the Style group:
  - ✓ **Text Above** – The comment will appear above  the pointer of the box when attached to the X/Y-graph. The comment will also appear on the Event Browser.
  - ✓ **Text Below** – The comment will appear below  the pointer of the box when attached to the X/Y-graph. The comment will also appear on the Event Browser.
  - ✓ **Not on Plot** – The comment will not appear on the X/Y-graph, but will only appear on the Event Browser.
  - ✓ **Only Show Symbol (not whole text) on Plot** – The text contents input for the comment will not appear within the comment box  when placed on the X/Y-graph. The text will still appear with the comment on the Event Browser.



Oven

To properly profile or monitor, the KIC software needs dimensional information about your oven. The methods used to do this depend upon the type of oven you're setting up.

The basic oven types are:

- Conveyorized
- Non-conveyorized.

*Note: Normally, each of these procedures are only performed once per oven installation. If you are setting a non-conveyorized oven, many items on the **Setup Oven** dialog box as well as the **More** features will not be available.*

To use this setup feature, choose **Oven** from the **Setup** list menu (ALT+S+O) or press the oven setup  icon on the toolbar. The **Setup Oven** dialog box will appear.

OVEN DIALOG BOX BUTTONS

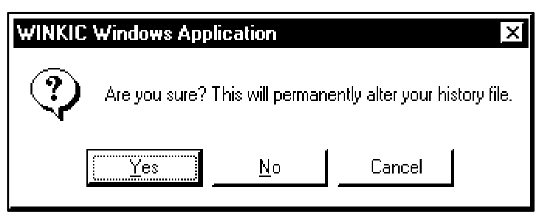
The following control buttons are found on the Setup Oven dialog box:

- More
- Update History / Save
- Save As
- Done

UPDATE HISTORY / SAVE

This button serves a double purpose – when making changes to the oven in the live mode, it becomes a **Save** button, and when in the history mode, it becomes an **Update History** button.

Update History



This button will only be enabled for use when you select a past event from the Event Browser and make changes to the oven setups that were in affect at the time of the event.

This feature allows you to edit historical oven settings and save them to the original history file. The intended use of this feature is to allow you to make corrections to past mistakes in the history file.

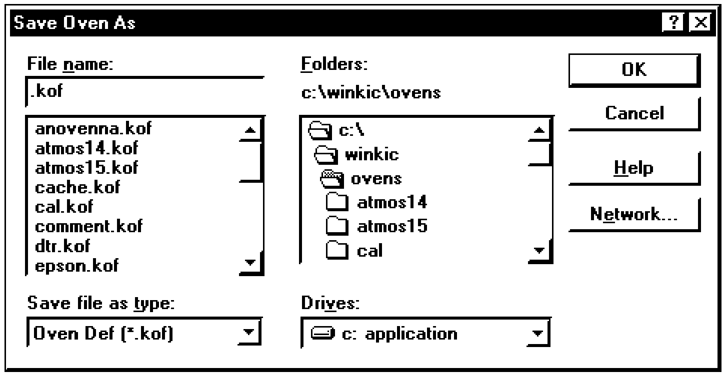
When selected, a dialog box will appear asking you to confirm this action.

Save

When selected, the changes to the oven setup will are saved to the Oven file.

SAVE AS

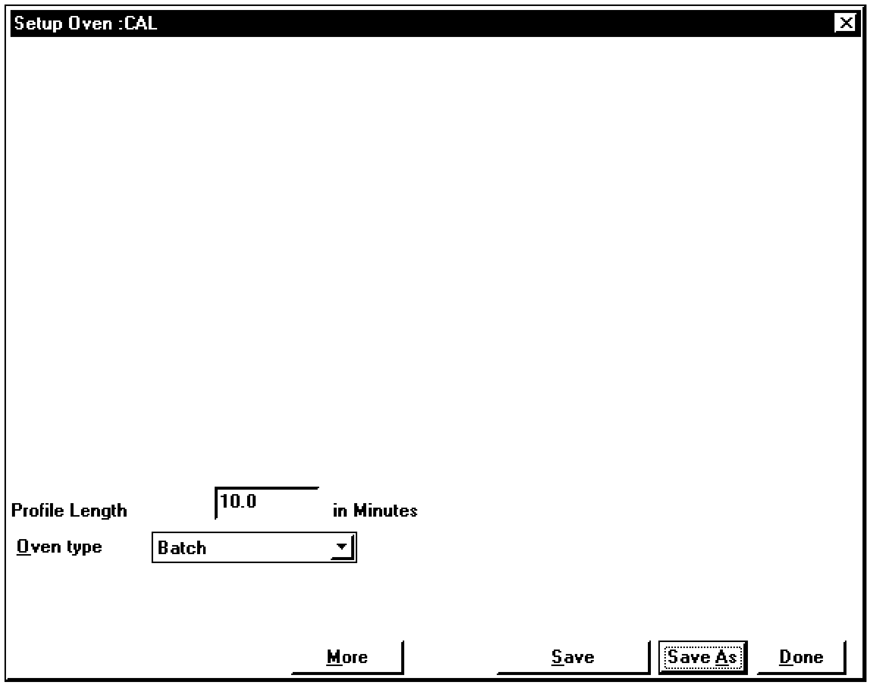
The **Save As** button will provide a means of editing the changes in one previously saved product, but saving them under a new file name, keeping the first product file intact. When selected, the **Save Product As** dialog box will appear.



NON-CONVEYORIZED OVENS

Non-conveyorized types are ovens that have no moving conveyor within them. The product is simply set inside a heating chamber and brought to one or more dwell temperatures for a time determined by the process specification.

Because non-conveyorized ovens are very uncomplicated (i.e., generally do not facilitate the use of KICprobes for monitoring), these are the easiest to setup.



PROFILE LENGTH

Input how long the profile will last in minutes.

OVEN TYPE

The non-conveyorized oven types include the following:

- Rework Station
- Batch
- Unknown

  Note: Select "Unknown" if your non-conveyorized process doesn't meet either of these descriptions.

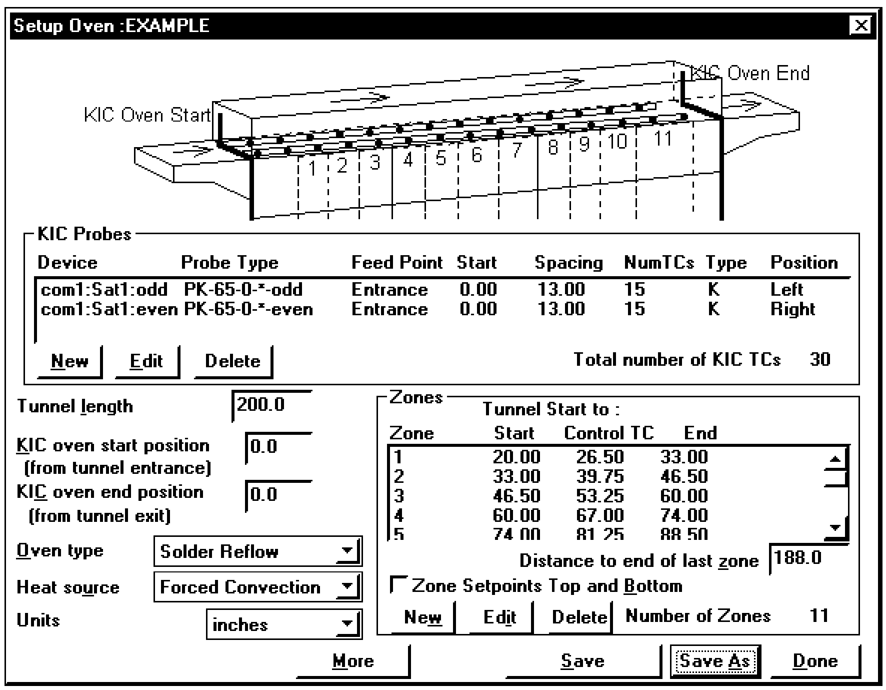
CONVEYORIZED OVENS

Conveyorized types are ovens that have a moving conveyor within them. The product is loaded onto the conveyor and is moved through the oven at a rate determined by your process standard.

In most cases, KICprobes will be used to monitor the oven. If you are using KICprobes and the upper half of the Setup Oven dialog box is still blank, the Hardware Input Monitor has NOT been correctly setup. **You will need to go back to the Hardware Input Monitor (previous section) to correct this situation.**

If KICprobes are not used, you may <u>disregard</u> all references to the KICprobe setup. Additionally, the upper half of the Setup Oven dialog box will be blank, reflecting the lack of need to setup the KICprobes.

To setup a conveyorized oven, first ensure that you have properly performed the oven measurement and that this data is available for inputting in the KIC software.



UNITS

Select the units used to measure the oven.

Note: This should always be the same as that used to perform the actual oven measurement, as recorded on the Oven Measurement Sheet.

TUNNEL LENGTH

Input the length of the oven tunnel. The tunnel length is the distance from the point where the product disappears inside the oven, to where it reappears outside the oven (i.e., entrance to exit).

KIC OVEN START POSITION

Input the location where the product profile will start.

Note: This should normally always be zero, unless you determine that the product profile should start at another point (outside the oven) because of machine restrictions.

KIC OVEN END POSITION

Input the location where the product profile will end.

Note: Again, this should normally always be zero, unless you determine that the product profile must end at another point (outside the oven) because of machine restrictions.

OVEN TYPE

Select the conveyorized oven type:

- Wave Solder
- Reflow
- Conveyor Furnace
- Vapor Phase
- IR-Vapor
- PWB Tack Dry/Cure
- IR-Convection

Note: If this is a wave solder oven, ensure that ***Wave Solder*** *is selected. The KICprobe setup facilitates another feature used to define the exact placement of the last two thermocouples which is non-applicable to other conveyorized oven types.*

HEAT SOURCE

Select the type of heat source(s) used by the oven type:

- Unknown
- Electric Heaters
- IR Bulb
- IR Panel
- Forced Convection

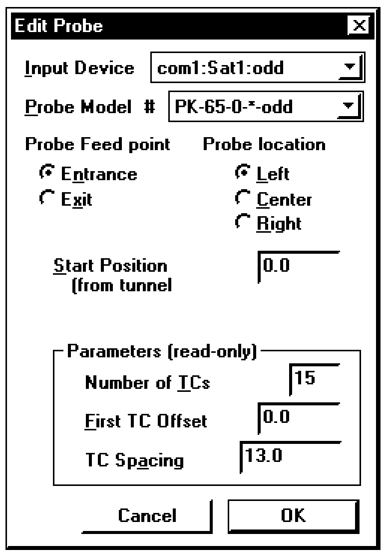
KICPROBE GROUP

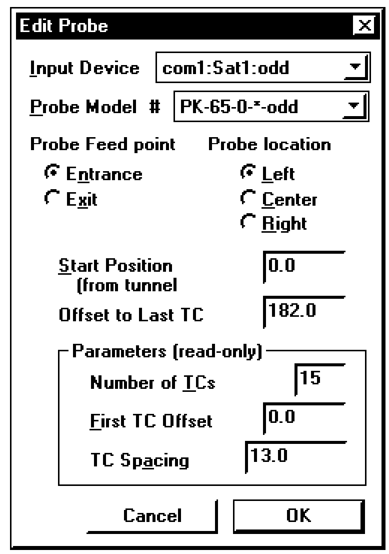
This group is only available on the Setup Oven dialog box when the Hardware Input Monitor is correctly setup with either one or more TPUs or KICboards with KICprobes attached. This group provides a listing of each of the KICprobes currently defined and setup for the oven.

To delete an existing KICprobe, select it with the mouse and click on the **Delete** button.

To edit an existing KICprobe, either double-click on the KICprobe from the list, or select it with the mouse and click on the **Edit** button. To setup a new KICprobe, click on the **New** button. In each of these two cases, the **Edit Probe** dialog box will appear.

Edit Probe





The **Edit Probe** dialog box provides the following items:

Input Device

Select the communication source that the temperature data will come from.

Probe Model

From the list menu, select the KICprobe part number as shown on the white heat shrink toward the connector end of the KICprobe.

Note: If your KICprobe part number does not appear on this listing, this may indicate that your KICprobes are customized, and require a special setup. Contact KIC Tech Support for instructions on how to setup a customized set of KICprobes.

Start Position

If the datum of the KICprobe is physically located either inside or outside the oven entrance (i.e., not exactly at the oven entrance), the offset of the KICprobe is input here.

Note: In most cases the KICprobe datum will always fall exactly at the oven entrance point (zero offset).

Offset to Last TC

This will only appear if you have selected a Wave Solder oven type in the Setup Oven dialog box. If you are setting up a wave solder process, you will need to input the distance of the offset of the last thermocouple in the KICprobe in this field. This is the distance from the oven's tunnel entrance to the chosen position (typically the tip of the solder wave) of the last KICprobe thermocouple.

Probe Feed Point

Select whether the KICprobes are physically mounted in the oven from the entrance or the exit. The default is Entrance.

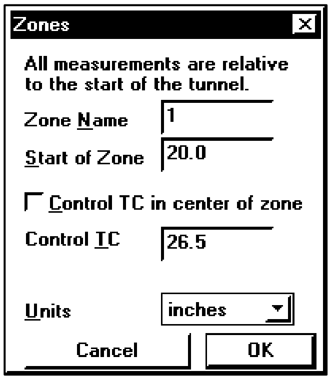
Probe Location

Select whether the KICprobe being setup is located on the left, center, or right of the oven, as viewed from the oven's tunnel entrance.

Parameters Group

These options are only used specifically for setting up a customized set of KICprobes, and are only used by a KIC Customer Support person.

ZONES GROUP



This group contains a listing of the oven's individual zone dimensions. A precise measurement of the zones is important to ensure accuracy of the Profile Prediction, Auto-Predict (optional) and Virtual Profiling tools.

To delete an existing zone, select it with the mouse and click on the **Delete** button.

To edit an existing zone, either double-click on the KICprobe from the list, or select it with the mouse and click on the **Edit** button. To setup a new zone, click on the **New** button. In each of these two cases, the **Zones** dialog box will appear.

Zone Name

Input a name for the zone (up to 7 characters). The zones are automatically labeled in numerical sequence if you choose not to give the zone an identifying name.

Units

Select the unit of measure used. In most cases, this will be the same unit of measure used to describe the oven length. If this is the case, the correct unit of measure will already be selected for you.

Start of Zone

Input the number of inches from the tunnel entrance that this zone begins, as reflected on your Oven Measurement Sheet.

*Note: Remember that you are inputting ONLY the data for the zone start. With the exception of the last zone defined (described later in **Distance to the End of Last Zone**), the "end" of each zone is literally the start of the next zone.*

Control TC in Center of Zone

If the oven's closed-loop control thermocouple is centered in this zone, select this checkbox (default). If it is not, deselect this checkbox and input the distance from the oven's tunnel entrance that this control thermocouple is actually located.

Note: Remember that if there is a "gap" between two zones, the control thermocouples within these two zones will, in most cases, not be centered.

DISTANCE TO THE END OF LAST ZONE

Input the distance from the oven entrance to the end of the last zone of the oven.

ZONE SETPOINTS TOP AND BOTTOM

If you will be adjusting the upper portion of the zones with different setpoints than the bottom portion of the zones, select this checkbox.

*Note: The oven model must be capable of facilitating this operation in order to use it. If your oven provides this feature, but you will not be implementing it, leave this **Zone Setpoints Top and Bottom** unchecked.*

MORE BUTTON (OVEN)

Other options are available to you that can help define that way your oven setup operates. These options are available only through the **Setup Oven** dialog box's **More** button.

As with any machine settings or adjustments you perform on other equipment, you should ensure that any changes to these settings are thoroughly documented in your process standard.

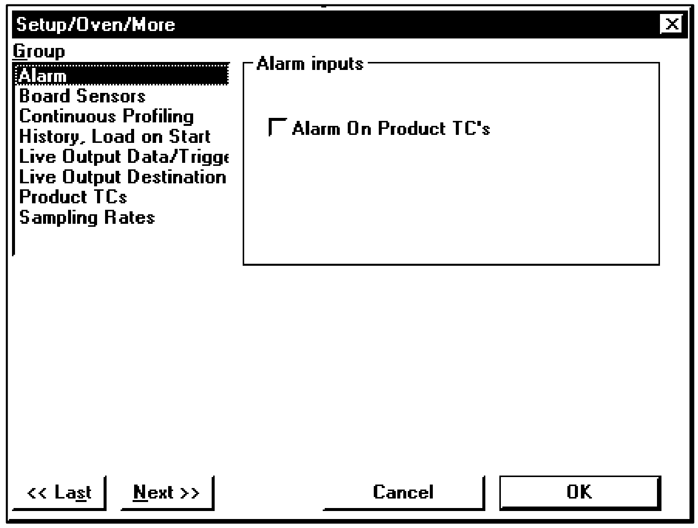
Like the oven setup, once changes are made to these settings, they should normally remain unchanged for the oven. However, if you later decide to implement optional features, such as *Live Data Output*, *QC-Calc SPC*, *Board Sensors*, or *Barcode Readers*, this is where the changes to your existing setup will take place. To learn more about these other options, contact your local KIC Representative or contact KIC Sales at (619) 673-6050.

When the More button is selected the Setup/Oven/More dialog box appears. In this dialog box are 7 groups that allow finer control over the behavior of the oven setup:

- Alarm
- Board Sensors (optional)
- Continuous Profiling
- History, Load on Start
- Live Output Data/Trigger (Prophet Thermal Manager required)
- Live Output Destination (Prophet Thermal Manager required)
- Product TCs
- Sampling Rates

Note: Normally, these options shouldn't be changed. For most applications, the default settings work best.

ALARM GROUP

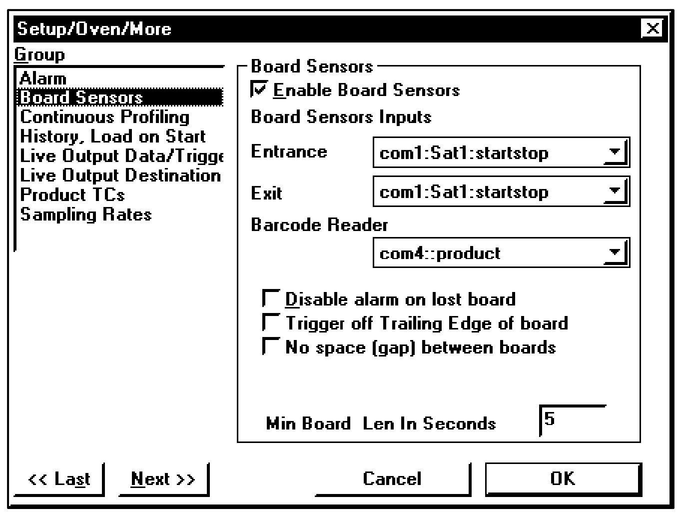


The Alarm group contains only a single feature, the **Alarm On Product TC's** checkbox. When selected, this will cause the KIC software to output an alarm when a user determined temperature has been reached, as setup in the KIC software's Statistics Table.

Alarm on Product TCs

Selecting the **Alarm on Product TCs** check box will cause the KIC software to alarm when the product thermocouples reach the values defined in the **Setup/Recipe/Statistics (temp)** dialog box. This is a special feature that is not commonly used. The default of this option is off, or unchecked.

BOARD SENSORS GROUP (OPTIONAL)



This optional feature provides the setup for both the Board Sensors and the Barcode Readers.

If you will simply be implementing a Barcode Reader with the KIC software, select the computer's communication source (COM port) from the Barcode Reader list menu.

Note: If you find that there are no options inside this list menu, you're Hardware Input Monitor has probably not been setup to accept this type of device. To correct this, go back into the Hardware Input Monitor and click on the ASCII inputs button to ensure that the BARCODE.DLL is selected for the COM port your barcode reader is attached to.

Enable Board Sensors

Select this checkbox to have the KIC software use a Board Sensor system. When selected, additional options will appear within this group.

Entrance

Select the communications source from the list menu that the Oven will use for this Board Sensor system. This will typically be the same COM port and TPU that is already assigned in the **Setup Oven** dialog box for the KICprobes.

Exit

Select the communications source from the list menu that the Oven will use for this Board Sensor system. This will typically be the same COM port and TPU that is already assigned in the **Setup Oven** dialog box for the KICprobes.

Min Board Len in Seconds

Input the time duration (in seconds) that a Board Sensor must be activated before the KIC software will determine that a board has been found. This time duration will typically ensure that the KIC software will disregard momentary tripping of a Board Sensor by other means (i.e., hand accidentally placed over/under it) except an actual board.

Disable Alarm on Lost Board

If you choose NOT to have the KIC software cause an alarm when the absence of a board is detected, select this checkbox.

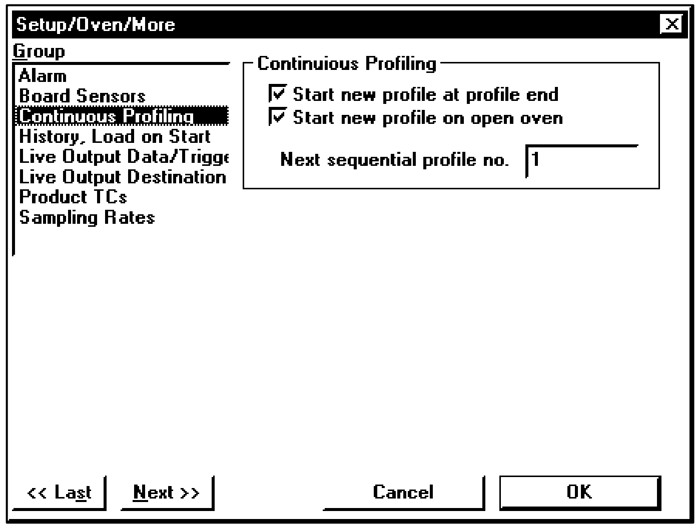
Trigger Off Trailing Edge of Board

By default, the Board Sensor system will be trigger a board “event” as measured from the leading edge of the board. There may be circumstances, such as a “push” type over loading device, that make using the trailing edge of the board more practical. Select this checkbox if you desire to have the Board Sensor system trigger based on the detection of the boards trailing end.

No Space (gaps) Between Boards

This is a special feature that is implemented only when the “product” (usually not SMT boards) is expected to be a continuous flow.

CONTINUOUS PROFILING GROUP



This group contains a tool that facilitates automatic cycling of profiles without the need of user intervention. Profile Notes are also automatically handled through the use of counter that will increment by one for each profile run and enter this integer into the Profile Notes in lieu of user input.

Generally, these test settings are more prone for use in batch type ovens or bench-top experiments where there is no conveyor belt.

Start New Profile at Profile End

Select this checkbox to automatically start a new profile immediately upon the completion of a previous one. This setting will cause a continuous testing cycle to occur and can only be terminated by deselecting this checkbox.

Start New Profile on Open Oven

Select this checkbox to automatically start a new profile immediately upon opening the oven.

Note: The use of both settings together will start a cyclic test sequence to occur upon opening the oven. To automate this feature even further, the user can specify an oven to automatically start (see the History, Load on Start group) and load a specific recipe upon starting the KIC software.

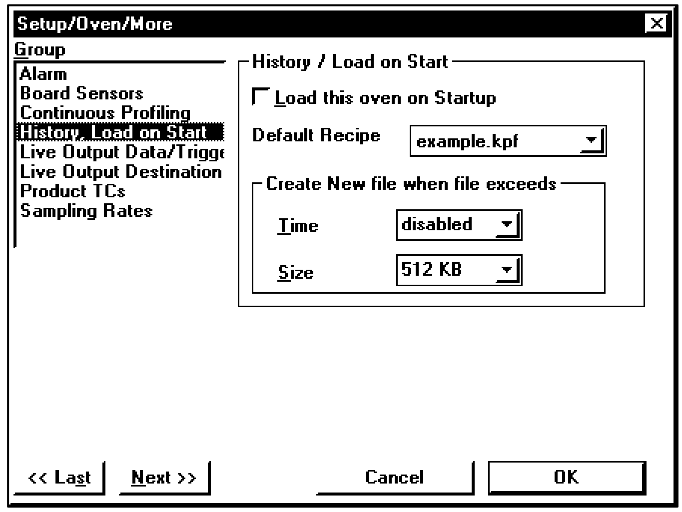
Next Sequential Profile No.

This field will contain an integer value specifying the numerical sequence the user wishes to designate the beginning of a cycle. These incremented values will be automatically input into the Profile Notes for each experiment. By default, no value is input in this field and no value is written to the Profile Notes. However if used, the counter will automatically increment by a value of 1 and cannot be changed.

HISTORY, LOAD ON START GROUP

The options available in this group allow you to define:

- Which files should open automatically
- Size limitations to the history files
- How large the KIC system's historical files can be before closing out the last file and automatically starting a new file.



Load this Oven on Startup

Select this checkbox if you want this oven to automatically load when the KIC software is started. The default for the box is off, or unchecked.

Default Recipe

This list menu contains recipes associated with this oven. By choosing a recipe from this list box, the KIC software will automatically load this recipe each time this oven is loaded.

Create New File when File Exceeds

This feature allows you to define the point at which the KIC software will close an existing history file and open another.

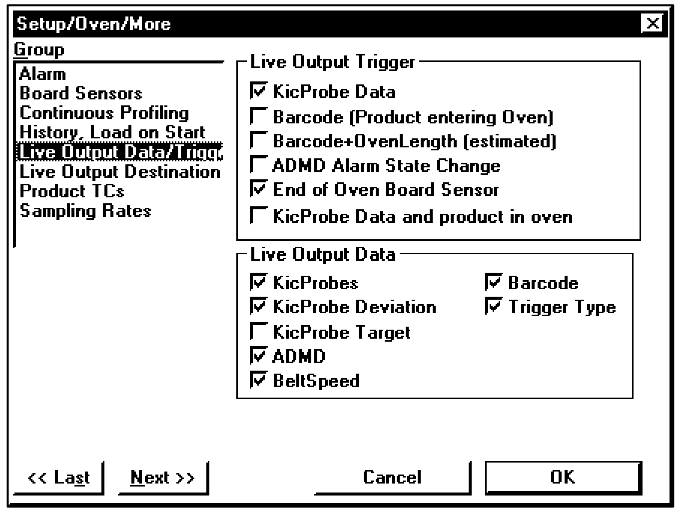
- **Time** - The options in this list box vary from 1 hour to 1 week. The default is disabled.
- **Size** - The options in the list box vary from 50Kb to 1024Kb. The default is 1024Kb.

Note: These two options function as an "OR" qualifier. If you choose 8 hours for the Time and 500Kb for the Size, the current history file will close and a new one will be opened depending on whichever value is reached first.

LIVE OUTPUT DATA/TRIGGER GROUP (OPTIONAL)

These options are associated with outputting the KIC software data in real-time to another application or file and are used in conjunction with the Live Output Destination group. This particular group allows you to select the output data strings as well as the trigger(s) that force the output to occur.

The use of this feature is dependent upon the use of the Prophet Thermal Manager system.



KICprobe Output Trigger

The trigger is one or more reoccurring events that will cause the KIC software to output the data.

KICprobe Data

This event occurs each time the TPU is sampled for oven temperature data. This sampling frequency is defined in the Sampling Rates group.

The KICprobe Data trigger designation used with a standard KIC output format is **TKP**.

Barcode (Product Entering Oven)

This event occurs each time a barcode has been successfully scanned at the oven entrance. The use of Barcode Readers with the KIC software is a special feature which is not included with a standard Prophet Thermal Manager setup. For more information about this feature, please contact KIC Technical Support.

The Barcode/Product Entering Oven trigger designation used with a standard KIC output format is **TBC**.

Barcode+OvenLength (estimated)

This event occurs each time a barcode has been successfully scanned at the oven entrance and the product has finished traversing the oven's length. The use of barcode readers with the KIC software is a special feature which is not included with a standard Prophet Thermal Manager setup. For more information about this feature, please contact KIC Technical Support.

The Barcode+Oven Length trigger designation used with a standard KIC output format is **TOE**.

ADMD Alarm State Change

This event only occurs whenever a change in the KIC software's Alarm state occurs. Alarm state changes can occur by:

- The Average Deviation (AD) transits between a normal, warning or alarm condition in any direction.
- The Maximum Deviation (MD) transits between a normal, warning or alarm condition in any direction.

The Alarm State trigger designation used with a standard KIC output format is **TCHG**.

End of Oven Product Sensor

This event occurs whenever the Board Sensor at the oven exit successfully detects the presence of a board. This trigger is intended to be implemented in conjunction with the Belt Speed output data and provides accurate measurements of the oven belt speed variations.

The use of Board Sensors with the KIC software is a special feature which is not included with a standard Prophet Thermal Manager setup. For more information about this feature, please contact KIC Technical Support.

The End of Oven Product Sensor trigger designation used with a standard KIC output format is **TBS**.

KICprobe Data and Product in Oven

This event occurs each time the TPU is sampled for the oven temperature data and a board is known to be inside the oven, as detected by the Board Sensor at the oven entrance. This prevents superfluous data from being output when the oven is idle and the output temperatures have little or no bearing on the quality of the product.

The use of Board Sensors with the KIC software is a special feature which is not included with a standard Prophet Thermal Manger setup. For more information about this feature, please contact KIC Technical Support.

The KICprobe Data and Product in Oven designation used with a standard KIC output format is **TKP**.

Live Output Data

There are one or more data types that can be output whenever the trigger(s) occur:

- KICprobes
- KICprobe Deviation
- KICprobe Target
- ADMD
- Belt Speed (optional)
- Barcode (optional)
- Data Trigger

KICprobes

This data consists of all the raw thermocouple values of the KICprobes. There are no calculations or adjustments made to this data.

KICprobe Deviation

This data consists of the individual deviation data for each KICprobe thermocouple. This field can only be used when a Virtual Profile has previously been created and is currently in use.

KICprobe Target

This data consists of the individual KICprobe Target values, as established at the start of the product profile subsequently used to create the Virtual Profile. This field can only be used when a Virtual Profile has previously been created and is currently in use.

ADMD

This data consists of the Average and Maximum Deviation values as well as the identifier for the Maximum Deviation thermocouple. This field can only be used when a Virtual Profile has previously been created and is currently in use.

Beltspeed

This data consists of the calculated belt speed measurement for the oven's entire length, as detected by the entrance and exit sensors of the Board Sensor system. This field is only available through the use of the Board Sensor option.

Barcode

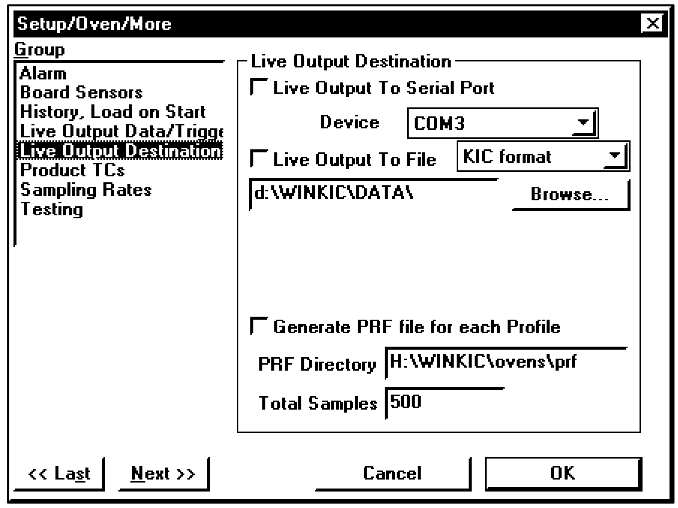
This data simply consists of the barcode number read directly off the products barcode label. This field is only available through the use of the Barcode Reader option. This data is "associative", or data used identify a specific record or record group, and not used as a direct measure.

Trigger Type

This is a "tag" or identifier that can additionally be output with other data that identifies which trigger event cause the output of that particular data to occur. This is most useful when employing two or more trigger types and you need to be able to segregate the output data by the events that caused the trigger. This data is "associative", or data used identify a specific record or record group, and not used as a direct measure.

LIVE OUTPUT DESTINATION GROUP

These options are associated with outputting the KIC software data in real-time to another application or file and are used in conjunction with the Live Output Data/Trigger group. This group will provide a means of defining the directional flow of the output data.



Live Output to Serial Port

Select this checkbox to enable the data output via a serial (COM) port.

Device

Used in conjunction with the Live Output to Serial Port checkbox, this list menu is used to define which discrete COM port the data will be sent out. The selections are COM ports 1 through 8 regardless of how many physical COM ports are actually setup on the computer.

Live Output to File

Select this checkbox to have the data output written to an ASCII file.

KIC Format

This is the default output file format. Each data set is written in one continuous data stream which constitutes a record. Carriage returns and line feeds delineate the end of one record and the start of the next.

This is a general output format that can allow you to use or write other applications that can read and process this information using your own standards.

By default a TAB delimitated format is used with the output data and cannot be changed. The following is a brief of some of the common output fields that the KIC software generates:

- The **date/time** field is controlled by the date/time output format found in the Copy dialog box or the Setup/Technical dialog box and include the following possibilities:
  - ✓ **Date/Time** – 11/20/95 16:27 Note: There exists a space between the date and time.
  - ✓ **YYMMDDHHMMSS** – 951120162727
  - ✓ **HHMMSS** – 162727
  - ✓ **Seconds from Start** – 816913644 (see note below)
  - ✓ **Minutes from Start** – 13615227 (see note below)

Note: The KIC Software measures time in seconds since midnight January 1, 1970. This time is resolved to the nearest millisecond.

- The **oven identifier** field contains the 8 characters of the oven's file name.
- The **temperature scale** field is controlled by the Y-axis scale reference in the Setup/Recipe dialog box and will be one of the following three designations:
  - ✓ **C** – Celsius (Centigrade)
  - ✓ **F** – Fahrenheit
  - ✓ **K** – Kelvin
- The **output trigger** field identifies what event caused the data to be output from the KIC software and may be one of the following five designations:
  - ✓ **TKP** – KICprobe sample was taken.
  - ✓ **TBC** – Barcode was read at the oven start area.
  - ✓ **TOE** – Barcode was read at the oven start and the product is now estimated to be at the oven exit area.
  - ✓ **TCHG** – Change in the KIC software's alarm state has occurred.
  - ✓ **TBS** – Board was detected by the Board Sensor at the oven exit area.
- The **associated string** field will typically contain the barcode number of the product when used. When no barcode reader is in use, this field will simply contain two dashes (i.e., "—").
- The **record type** field is a two to four character code that classifies the output record by identifying the source of the data:
  - ✓ **KP** – KICprobe record.
  - ✓ **KPD** – KICprobe Deviation record.
  - ✓ **KPT** – KICprobe Target values record.
  - ✓ **ADMD** – Average Deviation and Maximum Deviation record.
- The **data field** contains either raw temperature data from the KICprobe thermocouples, or calculated data such as the Average and Maximum Deviations.
- The following output fields are only associated with the ADMD outputs:
  - ✓ **MDTC** – Maximum Deviation Thermocouple is used to identify which of the KICprobe thermocouples reported the Maximum Deviation (MD). This field will contain an integer.
  - ✓ **Alarm State** – This field will contain an integer that is directly associated with the state of the KIC software's alarm:
    - ∗ 0 – **Alarm Good**. Associated with a "green" condition it means that the oven temperatures were within the user specified limitations and the process was in-control.
    - ∗ 1 – **Alarm Warning**. Typically associated with a yellow alarm condition, this a warning that the user to take action to prevent an out-of-control condition from occurring in the process.
    - ∗ 2 – **Alarm Error**. Associated with a red alarm, this condition indicates a process that has moved at or beyond the process limitations specified by the user and is out-of-control.
  - ✓ **Alarm (verbose)** – This field simply contains the verbose version of the Alarm States described above.
    - ∗ **Alarm Good**
    - ∗ **Alarm Warning**
    - ∗ **Alarm Error**

KICprobes

When selected, all raw temperature data from the KICprobe thermocouples will be output.

KICprobe Deviation

When selected, the deviations of each individual KICprobe thermocouple will be output. The deviations reference how far from the KICprobe Target (nominal value) the current thermocouple reading is.

KICprobe Target

This is a special application output record that reports the current target values for the KICprobe thermocouples. This output type provides little use as a repeating output since the data will only change if a new Virtual Profile was created or a different recipe was loaded. It's primary purpose is to report the KICprobe nominal values for applications that utilize and support custom defined calculations.

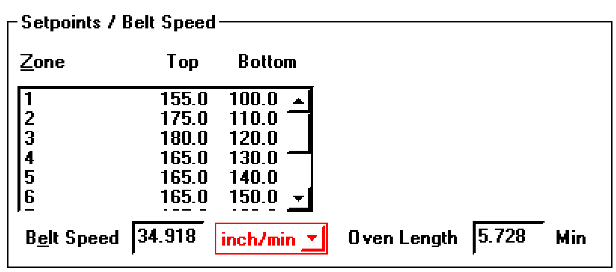
ADMD

With this option selected a record will be output that includes the Average Deviation, Maximum Deviation, the Maximum Deviation Thermocouple identification and the state of the KIC software Alarm in both code number and verbose.

Belt Speed

The belt speed output record will contain information about the speed of the oven conveyor system as measure from the start Board Sensor to the end Board Sensor. Measuring the belt speed in this fashion offers the added advantage of accuracy because the velocity is measured over practically the entire distance of the oven's length.

The output belt speed value is expressed using whichever reference is currently selected in the **Setup Recipe** dialog box.



QC-Calc Format

(Refer to the <u>QC-Calc for Windows</u> user manual for information about this format.)

Generate PRF File for Each Profile

- Select this checkbox to create an ASCII file of product thermocouple data each time a profile is run. The KIC software will automatically create a new file for each profile using the DOS file extension of .PRF .

PRF Directory

Enter the directory path where the .PRF files will automatically be written to. This path can be either a local or network drive.

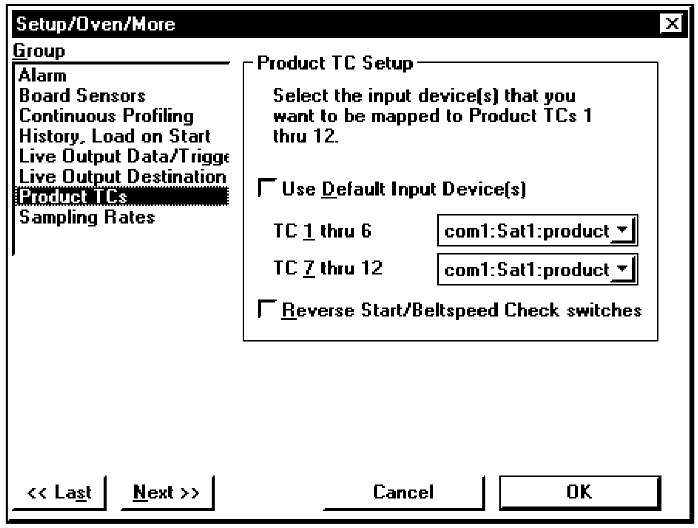
Note: If sending this information to a network drive, it must be shared.

Total Samples

Input the total number of data samples that the .PRF file should contain for each thermocouple used. The KIC software will resample the total data samples taken to the sample quantity specified here. This ensures that the .PRF files contain like amounts of data samples that permit direct comparisons between files. The default is 500 samples.

PRODUCT TCS GROUP

The settings are specific to conducting a temperature profile and permit assignment of:



- The product thermocouple input sources which will provide the temperature data for the profile.
- The hardware buttons used to start and end the profile.

Use Default Input Devices

This checkbox allows product thermocouple input source devices to be defined. When checked, the source device will always be the TPU used to assigned to the KICprobes, or in the case of a standalone SlimKIC or SideKIC, the computer COM port to which the receiver is connected to.

When not checked, the user has the capability to redirect the product thermocouple input source(s) to a specific devise, regardless of any other devices already assigned the oven setup.

- **TC 1 Thru 6** – Select the source for which the product thermocouple inputs 1 through 6 should come.
- **TC 7 Thru 12** – Select the source for which the product thermocouple inputs 7 through 12 should come.

Note: Selecting "disabled" will always ignore inputs on these thermocouples and will cause the corresponding buttons on the Thermocouple Button bar to not be viewed, even if the these thermocouples are defined in the Setup/Product dialog box.

Reverse Start/Stop Switches

This option is included to help facilitate the physical location of the receiving antenna when using the SlimKIC or SideKIC.

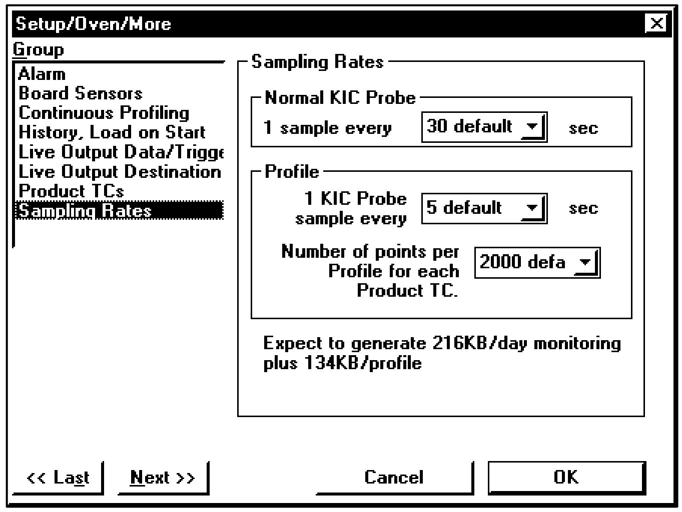
Normally (deselected), the receiver button is used for the profile start and the hand held switch is used to perform a belt speed check once the product exits the oven tunnel.

To swap the functions of these two switches, select the checkbox.

Note: The KIC hardware/software has no profile "stop" switch per se. Normally, the software will continue to collect data past the end of the oven in an amount equal to 20% of the total time needed for the product to travel from the profile start position to the end of the oven's tunnel. This extra data may be needed to "fit" the profile during Profile Prediction operations.

The only exception to this rule is when Continuous Profiling is being used. When using Continuous Profiling, only the exact length of time from start to finished is used.

SAMPLING RATES GROUP



This group contains user selected options that define the frequency at which the different data types are collected.

The data types are:

- KICprobe Temperatures
- Product TC (i.e., profile) Temperatures

One key concept that should be understood is that the KICprobe sampling frequency can, and should vary, depending upon the work being performed. When the KICprobes are simply collecting data that will not be correlated to profile data in time, the sampling frequency is less (i.e., spaced further apart).

However, when a profile is being run it is crucial, for the purpose of accuracy, that the KICprobes increase the frequency at which the data is collected because this data will be used to create baseline information for such things as Profile Prediction and Virtual Profiling.

Normal KICprobe Sampling

This is the sampling frequency when the KICprobes are idly collecting data and no profile is being run. The default value is 30 second intervals between data samples.

From the list menu, select the desired sampling rate. The minimum sampling rate is 2.5 second intervals

Profile

This section of the dialog box pertains specifically to samples taken on both the KICprobes as well as the product thermocouples when profiling.

1 KICprobe Sample every X sec

Select the sampling frequency to be used for the KICprobes when a profile has been initiated. Generally, this frequency is much higher than the frequency used for normal KICprobe sampling. This higher frequency ensures a higher degree of accuracy when the data is used for Profile Prediction and/or Virtual Profiling.

The default value is 1 KICprobe sample every 5 seconds.

Number of Points per Profile per Product TC

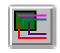
Select the maximum number of samples that each product thermocouple will be limited to when running a profile. The KIC software will automatically consider the length of the oven and the conveyor speed, then determine a sampling frequency that will ensure that total number of samples per thermocouple does not exceed this limit.

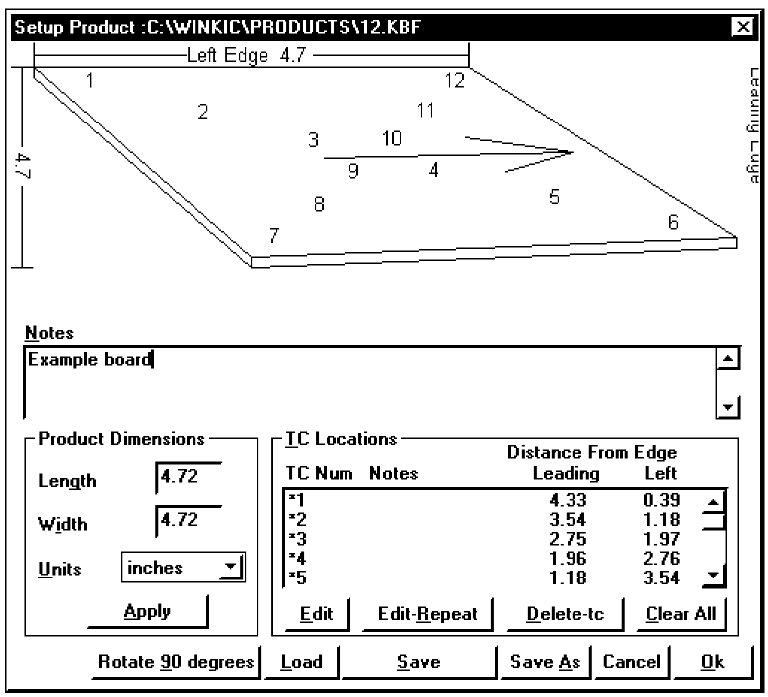
The default value is 2,000 points (samples) per thermocouple.

Product

This option provides the means of defining the physical location of the thermocouple placements onto the product. This information is used to provide a visual queue to the user as well as provide the KIC software with the data needed to represent the actual offsets of the thermocouples as displayed in real-time on the X/Y-graph.

These offsets are important because they represent actual temperature measurements taken at the same times but at different locations within the oven, and are accounted for when utilizing the Profile Prediction or Virtual Profiling tools.

To access this feature, choose **Product** from the **Setup** list menu, or press ALT+S+P, or select the  button from the toolbar. When selected, the **Setup Product** dialog box will appear.



PRODUCT DIALOG BOX BUTTONS

The following control buttons are found on the Setup Product dialog box:

- Rotate 90 Degrees
- Load
- Update History / Save
- Save As
- Cancel
- OK

ROTATE 90 DEGREES BUTTON

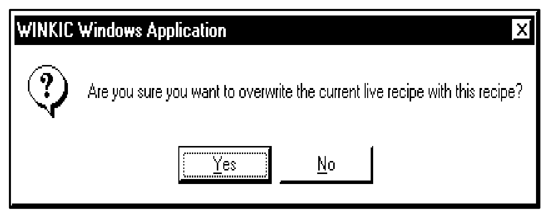
This button will provide a means of rotating the product by 90º increments, without the need to redefine the product thermocouple locations.

This feature is useful when weighing the advantages and disadvantages of different product throughput orientations.

APPLY LIVE

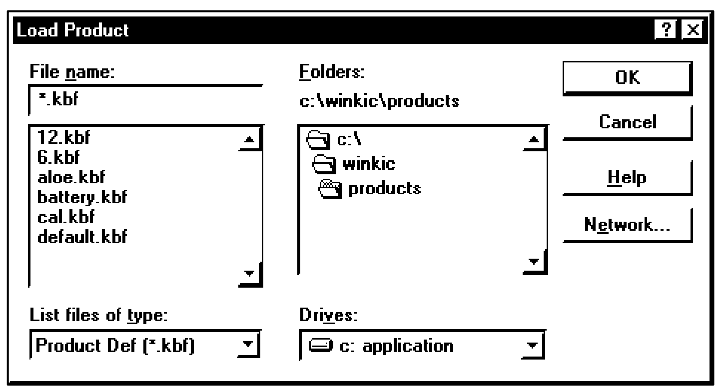
The Apply Live button provides a quick means of choosing a past event from the Event Browser and applying the product settings to the product currently in use (live mode).

When selected, a dialog box will appear asking you to confirm this action.



LOAD

This button is used to load a previously saved product. When selected, the **Load Product** dialog box appears.

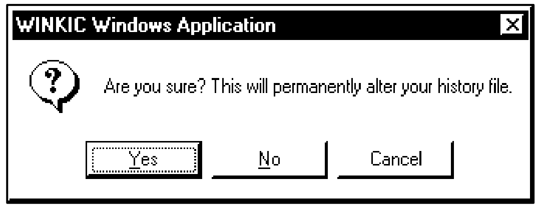


UPDATE HISTORY/ SAVE

This button serves a double purpose – when making changes to the product in the live mode, it becomes a **Save** button, and when in the history mode, it becomes an **Update History** button.

Update History

This button will only be enabled for use when you select a past event from the Event Browser and make changes to the product that was in affect at the time of the event.



This feature allows you to edit historical product settings and save them to the original history file. The intended use of this feature is to allow you to make corrections to past mistakes in the history file.

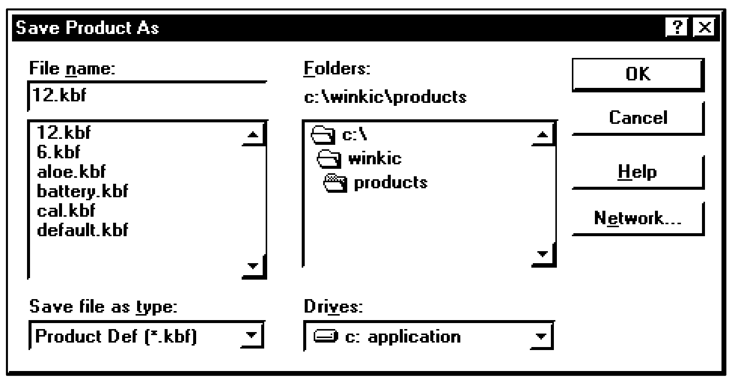
When selected, a dialog box will appear asking you to confirm this action.

Save

When selected, the changes to the product will be saved to the currently loaded product file.

SAVE AS

The Save As button will provide a means of editing the changes in one previously saved product, but saving them under a new file name, keeping the first product file intact. When selected, the **Save Product As** dialog box will appear.



NOTES

Enter all applicable notes in this text box. These notes will appear on the printed report.

PRODUCT DIMENSIONS

This box is used to describe a two dimensional description of the product and the scale used for all measurements within the Setup/Product dialog box.

LENGTH

Input the length of the product. The length of the product refers to the dimension of the product that will travel along the longitudinal axis of the oven. The front of the

board is referred to as the "leading edge" and is the point from which all thermocouple placement measurements are referenced in regards to their positions longitudinally.

WIDTH

Input the width of the product. The width of the product refers to the dimension of the product that is oriented laterally in the oven (i.e., side-to-side). The left side of the product, as viewed from the rear, is the point from which all thermocouple placement measurements are referenced in regards to their positions laterally.

UNITS

Select the scale that will be used in all measurements in the Setup/Product dialog box.

TC LOCATIONS

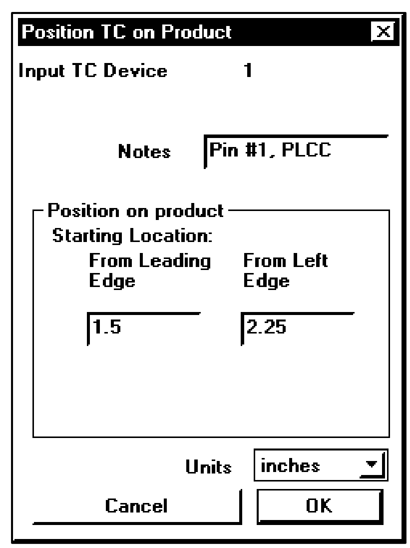
This box contains information about product thermocouple statuses, descriptions and their locations from the leading and left edges of the board.

Four buttons are provided to edit this information:

- **Edit** – This button is used to edit the information for a single thermocouple.
- **Edit-Repeat** – This button is used to edit the information for each thermocouple in sequence.
- **Delete-TC** – This button is used to delete a single thermocouple from the list. No warning is given the user before deletion.
- **Clear All** – This button is used to clear the entire listing of all information. A warning dialog box will appear prior to carrying out this operation.

EDIT AND EDIT-REPEAT BUTTONS

Selecting either the Edit or Edit-Repeat buttons will cause the **Position TC on Product** dialog box to appear.



The main difference between using these two buttons in that the Edit button will simply allow the user to access a selected product thermocouple from the TC Locations list and make changes to it's values.

The Edit-Repeat performs the same functions with one unique difference – when the user selects the OK button from Position TC on Product dialog box, the dialog box will again appear, but with next sequential product thermocouple information. Using the Edit-Repeat button decreases the effort needed to edit all the product thermocouples.

Notes

Input a description of where or what the product thermocouple is attached to.

Position on Product

This box is where the Cartesian coordinates for the product thermocouple locations is input.

From Leading Edge

Input the distance measured from the leading edge of the product to the location of the product thermocouple attach point. Real numbers are allowed, but will be rounded to the second digit when displayed on the TC locations list in the Setup/Product dialog box.

From Left Edge

Input the distance measured from the left edge of the product to the location of the product thermocouple attach point. Real numbers are allowed, but will be rounded to the second digit when displayed on the TC locations list in the Setup/Product dialog box.

Units

Select the scale that will be used in all measurement inputs.

Recipe

The word “recipe” has gained wide acceptance throughout the furnace industry and simply describes all of the oven setpoints that affect the heat transfer rate from the oven to the product. As used in the KIC software, recipe refers to the temperature setpoints of each zone, as well as the conveyor speed.

The recipe is also known as the “process”. Recipe is a name that many oven manufacturers nowadays use to reference the items on the oven that control the process, such as conveyor width and speed, air-flow or pressure, temperature setpoints, etc.

In the KIC software the recipe is used to describe the temperature setpoints for each of the oven’s zones as well as the belt speed of the conveyor.

Note: The two criteria that determine which setup groups appear on the Setup Recipe dialog box are whether or not the oven is a conveyorized type, and if so, whether or not KICprobes are being employed to continually monitor the oven’s temperatures.

When setting up a new recipe, first ensure that you have the correct Product file loaded. When you are finished setting up this recipe, you will save it. Saved with the recipe information is the name of the product file that was loaded. This will associate the product with the recipe later on.

The next time you load the new recipe, the associated product will automatically load with it. You can always reload a different product at another time and save the recipe again to create a new association.

The groups available in the Setup Recipe dialog box are:

- **Axis Scales** – Provides control over the axis scales used on the X/Y-graph.
- **KICprobe Stability** – Provides a means of determining the stability of the oven.
- **KICprobe TC Weights** – Will provide a means of adjusting the raw temperature data values used to perform some calculations.
- **Line Styles** – Provides control over how things are drawn on the X/Y-graph.
- **Notes** – Used to keep notes of the recipe setup.
- **Setpoints/Belt Speed** – Used to input which zones temperatures and conveyor speed are used for the recipe.
- **Statistics (temp)** – Will provide a means for selecting temperature based related statistics for viewing in the Statistics Table.
- **Statistics (time)** – Will provide a means for selecting time based related statistics for viewing in the Statistics Table.
- **Virtual Profile** – Provides access to creating and deploying a Virtual Profile.
- **Virtual Profile AD/MD** – Will provide a means of defining and using the Average Deviation and/or Maximum Deviation values and alarms.
- **Virtual Profile Bands** – Will provide a means of defining a tolerance band around the Virtual Profile.

To access this feature, choose **Recipe** from the setup list menu, or press ALT+S+R, or select the  button from the toolbar. When selected, the **Setup Recipe** dialog box will appear.

RECIPE DIALOG BOX BUTTONS

The following control buttons are found on the Setup Recipe dialog box:

- Last & Next
- Apply Live
- Load
- Update History / Save
- Save As
- Cancel
- OK

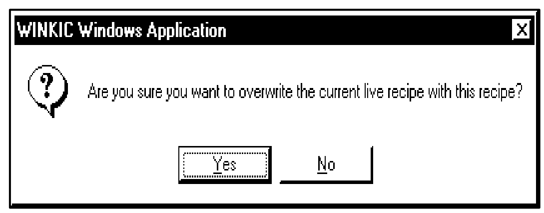
LAST & NEXT

These two buttons simply provide another means for scrolling through the group list.

APPLY LIVE

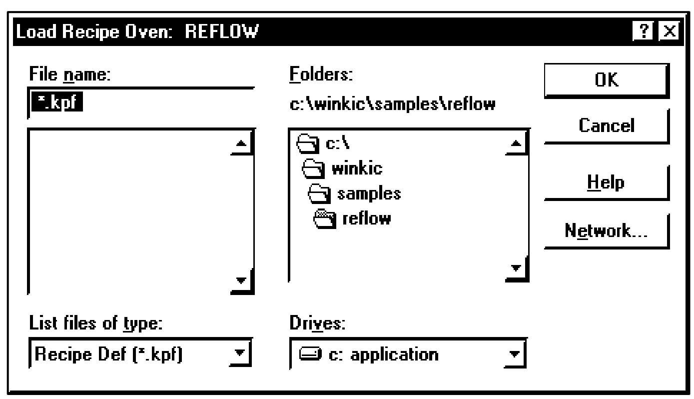
The Apply Live button provides a quick means of choosing a past event from the Event Browser and applying the recipe settings to the recipe currently in use (live mode).

When selected, a dialog box will appear asking you to confirm this action.



LOAD

This button is used to load a previously saved recipe. When selected, the **Load Recipe** dialog box appears.

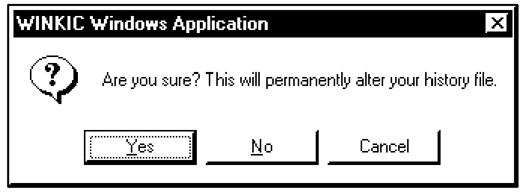


UPDATE HISTORY / SAVE

This button serves a double purpose – when making changes to the recipe in the live mode, it becomes a **Save** button, and when in the history mode, it becomes an **Update History** button.

Update History

This button will only be enabled for use when you select a past event from the Event Browser and make changes to the recipe that was in affect at the time of the event.



This feature allows you to edit historical recipe settings and save them to the original history file. The intended use of this feature is to allow you to make corrections to past mistakes in the history file.

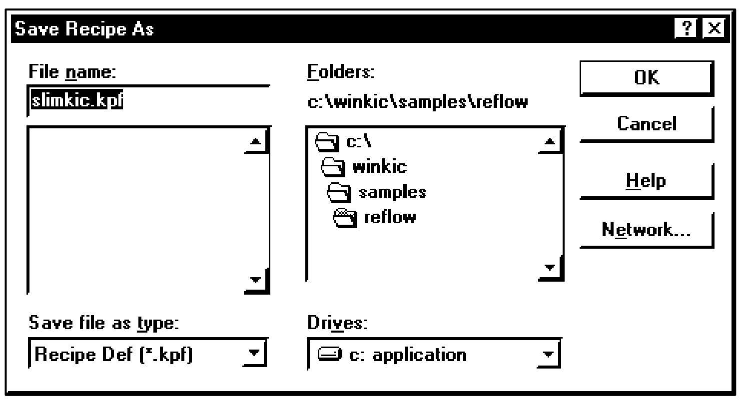
When selected, a dialog box will appear asking you to confirm this action.

Save

When selected, the changes to the recipe will be saved to the currently loaded recipe file.

SAVE AS

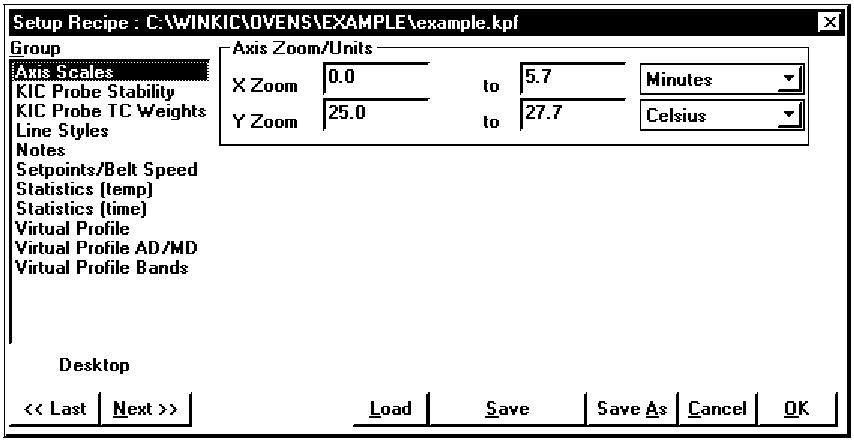
The Save As button will provide a means of editing the changes in one previously saved recipe, but saving under a new file name, keeping the first recipe intact. When selected, the **Save Recipe As** dialog box will appear.



AXIS SCALE GROUP

By default, the KIC software will attempt to always “fit” all data onto the X/Y-graph. This usually involves automatically resizing the graph to do so. The **Global Preferences** dialog box provides a checkbox to disable this feature.

Despite which values you use for the X-scale, this dimension is actually determined and controlled by the Oven Setup tunnel length and Recipe Setup belt speed in the case of conveyorized ovens, or Oven Setup profile time length in the case of a non-conveyorized ovens.



X ZOOM

These settings are referenced as time or distance on conveyorized ovens, or time on all other processes. The scales available are summarized below:

	Conveyorized Processes		Non-conveyorized Processes	
	Available?	Offsets?	Available?	Offsets?
Raw Seconds	Yes	No	No	N/A
Raw Minutes	Yes	No	No	N/A
Seconds	Yes	Yes	Yes	N/A
Minutes	Yes	Yes	Yes	N/A
Centimeters	Yes	Yes	No	N/A
Inches	Yes	Yes	No	N/A
Feet	Yes	Yes	No	N/A
Raw HH:MM:SS	Yes	No	No	N/A
HH:MM:SS	Yes	Yes	Yes	N/A
Raw Clock HH:MM:SS	Yes	No	No	N/A
Clock HH:MM:SS	Yes	Yes	Yes	N/A

This table shows which X-axis scales consider the Product TC location offsets in the profile data.

- **Raw Seconds** – This option will display the seconds needed for the product to traverse the oven, as determine by the oven length and the belt speed, on the X-axis and will not display product thermocouple offsets on the X/Y-graph.
- **Raw Minutes** – This option will display the minutes needed for the product to traverse the oven, as determine by the oven length and the belt speed, on the X-axis and will not display product thermocouple offsets on the X/Y-graph.

- **Seconds** – This option will display the seconds needed for the product to traverse the oven, as determine by the oven length and the belt speed, on the X-axis and will also display product thermocouple offsets on the X/Y-graph.
- **Minutes** – This option will display the minutes needed for the product to traverse the oven, as determine by the oven length and the belt speed, on the X-axis and will also display product thermocouple offsets on the X/Y-graph.
- **Centimeters** – This option will display the measured distance of the oven in centimeters on the X-axis and will also display product thermocouple offsets on the X/Y-graph.
- **Inches** – This option will display the measured distance of the oven in inches on the X-axis and will also display product thermocouple offsets on the X/Y-graph.
- **Feet** – This option will display the measured distance of the oven in feet on the X-axis and will also display product thermocouple offsets on the X/Y-graph.
- **Raw HH:MM:SS** – This option will display the hours, minutes and seconds needed for the product to traverse the oven, as determined by the oven length and the belt speed, on the X-axis and will not display product thermocouple offsets on the X/Y-graph.
- **HH:MM:SS** – This option will display the hours, minutes and seconds needed for the product to traverse the oven, as determined by the oven length and the belt speed, on the X-axis and will also display product thermocouple offsets on the X/Y-graph.
- **Raw Clock HH:MM:SS** – This option will display the real-time clock of the computer in hours, minutes and seconds needed for the product to traverse the oven, as determined by the oven length, belt speed, and current time, on the X-axis and will not display the product thermocouple offsets on the X/Y-graph.
- **Clock HH:MM:SS** – This option will display the real-time clock of the computer in hours, minutes and seconds needed for the product to traverse the oven, as determined by the oven length, belt speed, and current time, on the X-axis and will also display the product thermocouple offsets on the X/Y-graph.

USING THIS OPTION

Select your reference from the list box, then input your upper and lower limit values. *TIP: You can also select* ***RAW Minutes*** *or* ***RAW HH:MM:SS*** *from this menu. "RAW" means that the temperature data will be plotted as Temperature vs. Time, rather Temperature vs. Distance. Raw data would be used where "distance" is not an issue (i.e., Tack and Cure where the board is run vertically).*

Y ZOOM

The Y-axis always represents temperature. On the list to the right of the screen select the temperature scale you will be using. Fahrenheit, Celsius, Centigrade, and Kelvin are available.

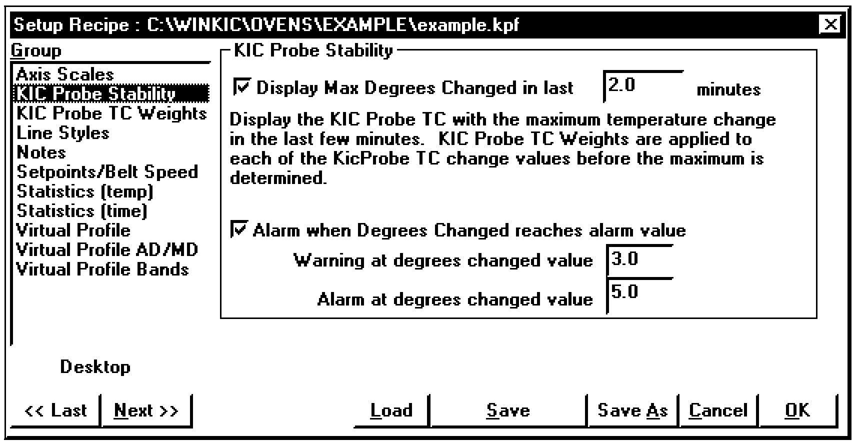
KICPROBE STABILITY GROUP

The KICprobe Stability is a measure of greatest temperature change in any of the KICprobe thermocouples over a user defined frame of time, and is completely independent of the Virtual Profile. The live KICprobe stability information, when selected for viewing, is displayed in the Data Times section of the KIC software screen.

This value is significant where the overall stability of the oven needs to be determined prior to running a profile, or when the oven is in undergoing a changeover from one product recipe to another. The **KICprobe TC Weights** affect the raw data values used to determine the stability.

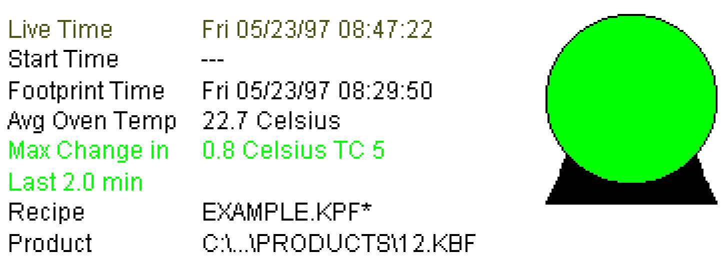
Use this value to help document the average amount of time required for the oven to stabilize between product changeovers.

Note: This group will not appear in this dialog when KICprobes are not assigned in the Setup Oven dialog box.



DISPLAY MAX DEGREES CHANGED IN LAST n MINUTES

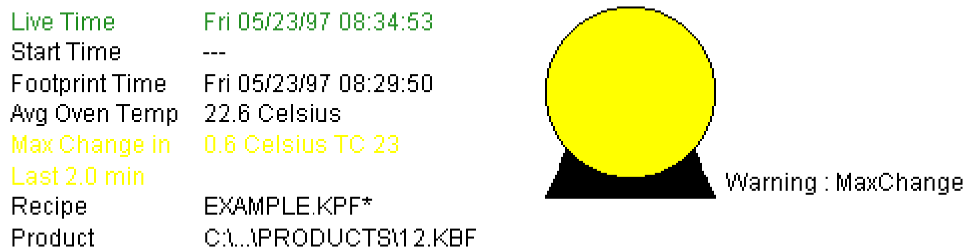
Select this checkbox to enable the use of this feature, then input the number of minutes to use as a time frame.



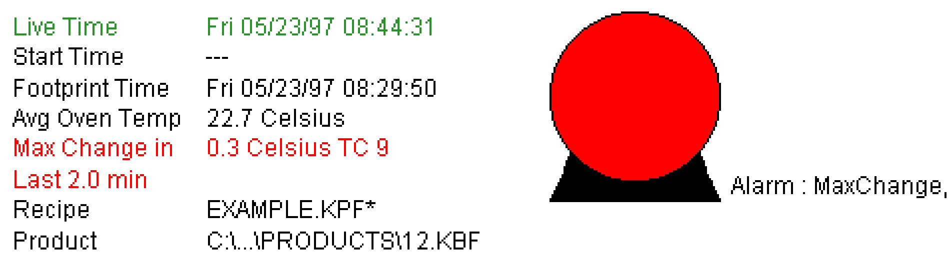
ALARM OPTIONS

- **Alarm When Degrees Changed Reaches Alarm Value** – Select this checkbox to activate the software and hardware (if used) alarms if the KICprobe stability becomes equal to or greater than the user assigned limitations.

- **Warning at Degrees Changed Value** – Enter value that will be used as the warning limit.



- **Alarm at Degrees Changed Value** – Enter value that will be used as the alarm limit.

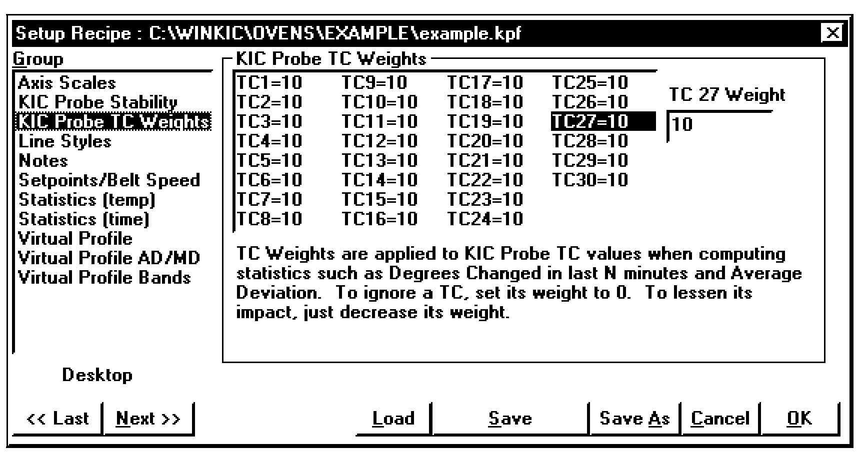


KICPROBE TC WEIGHTS GROUP

The KICprobe TC Weights provide an alternative method of adjusting the KICprobe thermocouple raw temperature to an amount approximately equivalent to the other raw values. They are only applied to the KICprobe Stability, Average Deviation (AD), and Maximum Deviation (MD) values.

Adjusting these values should only be performed where temperature range or movement is somewhat extreme. We highly recommend that you first investigate the root-cause of the “excessive” variation prior to using the KICprobe TC weights. If some other form of corrective action is appropriate, it should be considered first.

If you determine that the variation is normal and decide to use the KICprobe TC weights as a means of bringing that data inline with the other data, perform a thorough study first to determine what the appropriate value should be.



To lessen the impact of a KICprobe thermocouple's raw data value, decrease it's weight. A value of 10 (default) is equivalent to using 100% of the raw data value, a value of 5 is equivalent to using only 50% of the raw data value, etc. A value of 0 (zero) will completely exclude the data value from being used in any of the calculations.

The KICprobe thermocouple weights allow the user to fine-tune how the raw thermocouple data is weighted when performing calculations on the following items:

- Average Deviation (AD)
- Maximum Deviation (MD)
- KICprobe Stability

Note: This group will not appear in this dialog when KICprobes are not assigned in the Setup Oven dialog box.

USING THESE OPTIONS

Before changing the weights on any of the KICprobe thermocouples, a close analysis of the KICprobe thermocouple temperature variations should be made. Some large variations are normal, (depending on the physical location of the thermocouple in the oven) others are not. It is up to the user to determine the normalcy of the data.

Note: These settings are not intended to be used to hide or cover-up identifiable problems discovered on the oven through the use of this equipment. If variations are being created by some special cause, the root-cause should be identified and the proper corrective actions taken.

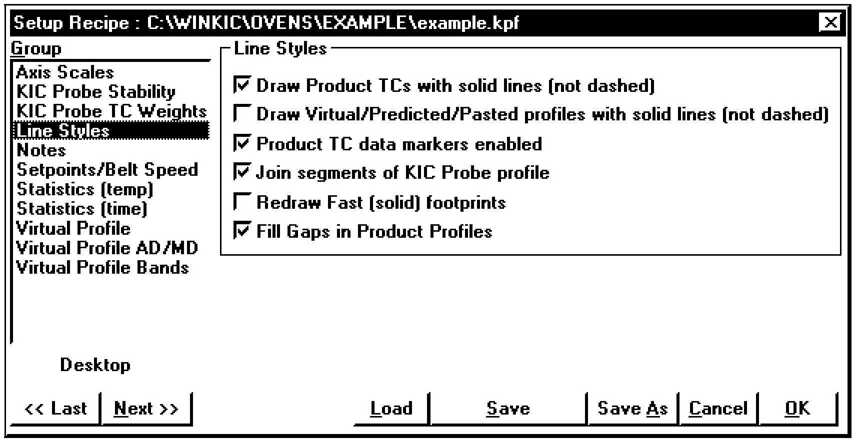
- Determine a strategy for weighting the data.
- Select the KICprobe thermocouple number to edit.
- Enter the new weight to be used.
- Repeat the previous steps until done.

LINE STYLES GROUP SETUP

This group contains items that affect the drawing of objects on the X/Y-graph that represent various types of data.

The first two items in the group affect the way the different types of profile information are displayed on the graph. By default, the Product thermocouples (real data) are always represented with solid lines, and all other profile data (i.e., Virtual, Predicted, Pasted) are represented with dashed lines.

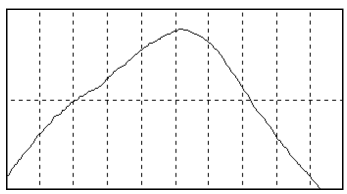
We recommend that you use this default setup to avoid confusion about what is being viewed on the display.

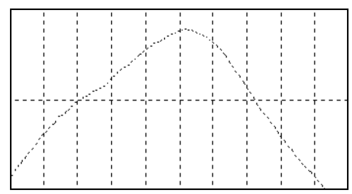


DRAW PRODUCT TCS WITH SOLID LINES (NOT DASHED)

By default, all product thermocouples are plotted on the X/Y-graph using solid lines. If this checkbox is selected, these are displayed as solid lines.

All reports generated using the KIC software will reflect the current setting.

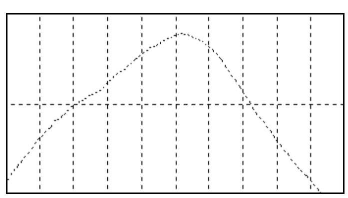


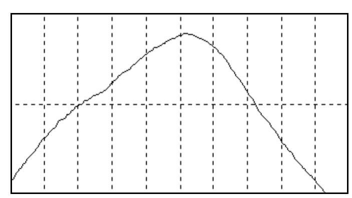


DRAW VIRTUAL/PREDICTED/PASTED PROFILES WITH SOLID LINES (NOT DASHED)

By default, all Virtual, Predicted, and Pasted thermocouples are plotted on the X/Y-graph using dashed lines. If this checkbox is deselected, these are displayed as dashed lines.

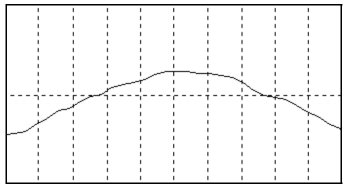
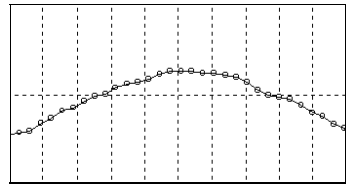
All reports generated using the KIC software will reflect the current setting.





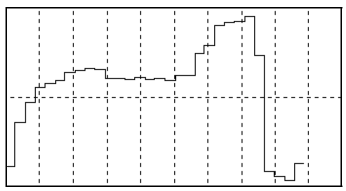
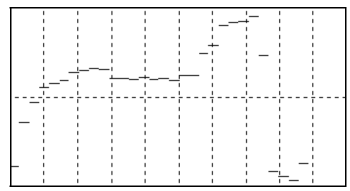
PRODUCT TC DATA MARKERS ENABLED

The data markers are used in conjunction with Zoom-in tool  to assist in locating precisely where the data lies in relation to the X/Y-graph as well as other data samples.

JOIN SEGMENTS OF THE KICPROBE PROFILE

Selecting this option will disjoin the segments of the KICprobe display.

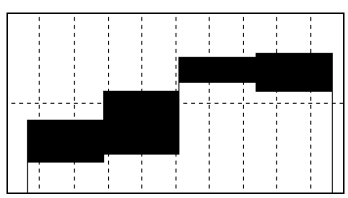
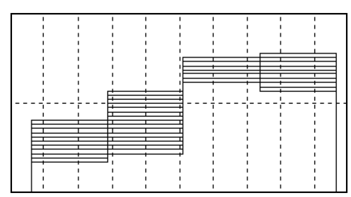
 

REDRAW FAST (SOLID) FOOTPRINTS

The footprint of the KICprobe shows the variance of the temperatures for each of the thermocouples over time. By default, the footprint is represented as a solid block which provides information about the upper and lower ranges of the variance.

Deselecting this option will cause the footprint to be displayed as lines representing the location along the Y-axis of each temperature reading taken throughout the duration of the footprint. The grouping of the data can help provide some idea about the temperature tends to fall.

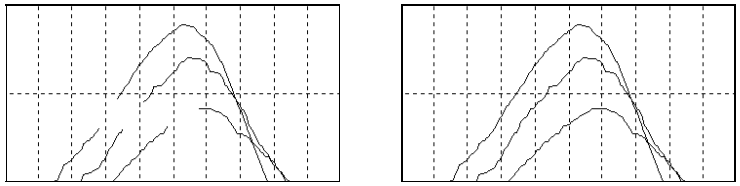
Note: For redrawing speed, this option should remain selected.

FILL GAPS IN PRODUCT PROFILES

Gap filling is a method of interpolating missing data caused by broken transmissions when profiling in real-time using the SlimKIC or SideKIC transmitters. This feature can be select before or after the profile was run to fill small gaps.

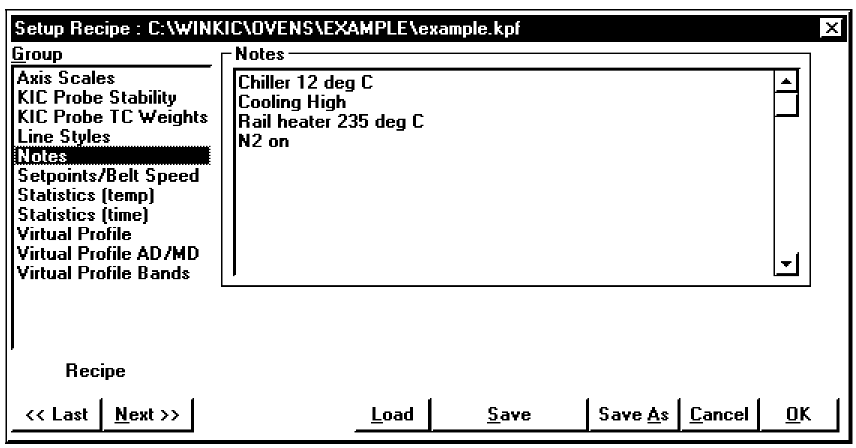
Note: Because there is no way correctly interpolate the data to correctly reflect dissimilar movements in the data, this feature should be reserved for gaps that occur for short periods of time (i.e., less than a second).



NOTES GROUP SETUP

As a general practice, you should input some applicable notes about the recipe whenever possible.

Whenever a new Recipe is loaded, the recipe name and the first line of the Notes contents will appear on the Event Browser if selecting for viewing.



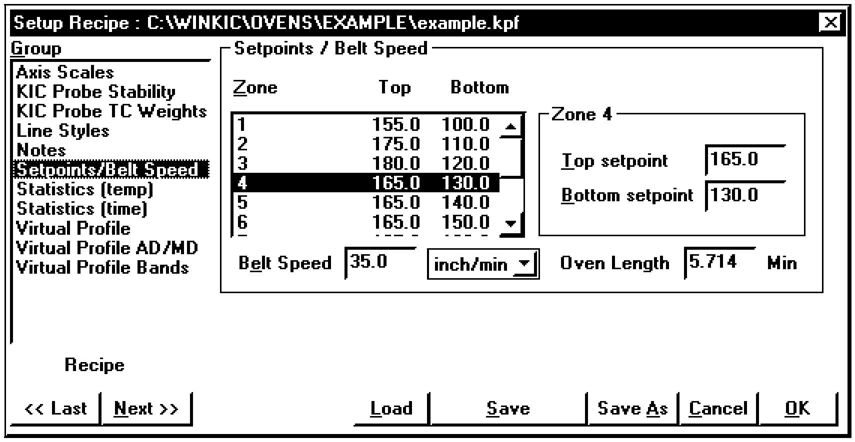
Some suggestions for the notes:

- Name or initials of the user creating or editing the recipe.
- Any special settings beyond what is already available in the recipe setup:
  - ✓ Gas used (i.e., air or nitrogen)
  - ✓ Gas-flow used (cfm)
  - ✓ Rail Heater ON or OFF
  - ✓ Cooling section settings (i.e., input/output water temperature, flow & pressure)
- Any other unique situation or conditions surrounding the use of the recipe.

  Note: The addition of the date and time the recipe was created or last edited is not necessary as this information is derived from the computer's date and time appended to the file when saved.

SETPOINTS/BELT SPEED GROUP

This group is literally the crux of the recipe itself. Here, the temperature setpoints for each of the zones and the conveyor speed are input into the KIC software. Additionally, it’s possible to further define different temperature setpoint for the upper and lower portions of any oven zone, should it be desired.



ZONE SETPOINTS (TOP & BOTTOM)

A list is provided that reflects the currently active temperature setpoints for all of the zones. To change the setpoint of any zone:

- Select the zone from the list. An input box will appear to the right of the list.

Note: Depending on the oven setup (Setup/Oven dialog box) this box may appear to allow a single input, or in the case where the upper and lower portions of the zone will be set at different setpoints, two input boxes will appear.

- Input the setpoints for the oven.
- With exception of the Cancel button, selecting any other object in the Setup/Recipe dialog box will cause the change to take effect.

Note: Immediately after having defined a new oven setup, the default zone setpoint for zone #1 will be 100 and each additional zone thereafter will be incremented by 10. This will create a stair-step like pattern for the zone setpoints as displayed on the X/Y-graph and indicates that the recipe has not yet been properly setup for the process.

BELT SPEED

The Beltspeed weighs heavily on the rate at which heat is transferred to the product. The slower the beltspeed, the greater the heat transfer rate. To change the beltspeed:

- Ensure that the scale (distance over time) being used is correct. Select the desired scale from the list menu provided. The options are:
  - ✓ cm/min – Centimeters per minute
  - ✓ cm/sec – Centimeters per second
  - ✓ inch/min – Inches per minute
  - ✓ inch/sec – Inches per second

- ✓ feet/min – Feet per minute
- ✓ feet/sec – Feet per second
- ✓ meters/min – Meters per minute
- ✓ meters/sec – Meters per second

- Input the value for the beltspeed that is set for the oven.
- With exception of the Cancel button, selecting any other object in the Setup/Recipe dialog box will cause the change to take effect.

Oven Length (Min)

This value, in minutes, is automatically calculated by the KIC software based on the oven length as defined in the Setup/Oven dialog box, and the beltspeed. The value provides the user some idea about the processing time for the oven and can be used to consider production line balancing.

STATISTICS (TEMP) GROUP

This group allows the user to select which statistical information should appear within the Statistics Table when the View Statistics  button is selected from the Toolbar.

Each statistic selected will cause the Statistics Table to display a separate column of values for the product thermocouples. Which product thermocouples appear in the column is determined by the following:

- They must first be defined in the Setup/Product dialog box. This will display the product thermocouples on the Thermocouple Button Bar.
- Those product thermocouples that appear on the Thermocouple Button Bar must be enabled (default).

View of the TC Button Bar.

In the figure above, note that although five thermocouples have been defined from the Setup Product dialog box and are displayed on the TC Button Bar, thermocouples 4 and 5 have been discretely deselected for display on the X/Y-graph. The statistics for thermocouples 4 and 5 will also no longer appear on the Statistics Table.

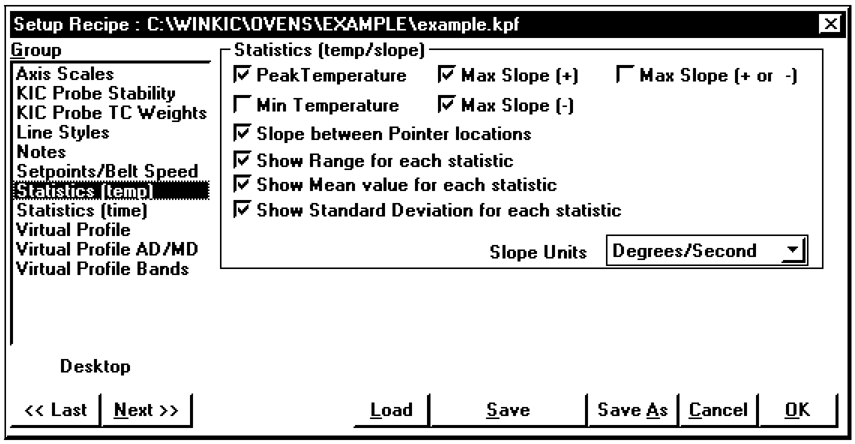
	Peak	Min	Max Rising Slope	Max Falling Slope	Max Slope
1 U8B1	218.6	24.8	1.79	-1.76	1.79
2 U7H1	213.5	25.3	1.73	-1.42	1.73
3 BOARD	226.3	25.3	1.99	-2.62	-2.62
TC Mean	219.5	25.1	1.83	-1.93	0.30
TC SD	6.5	0.3	0.14	0.62	2.53
TC Range	12.8	0.6	0.26	1.21	4.41

The Statistics Table

In the Statistics Table, the user selected statistics occupy the column headings and the product, predicted and virtual thermocouples occupy the row headings. The only exception to this are the Mean, Standard Deviation, and Range statistics. These are used to summarize a column of statistics.

All values associated with time in the KIC software, such as slope, are typically expressed as hundredths. All other values, such as where the Pointer intersects with the temperature profile and X-axis, are expressed in tenths.

Note: Only those statistics that the user determines are necessary to provide a comprehensive analysis of the process should be selected.



PEAK TEMPERATURE

Selecting this checkbox will cause the Statistics Table to display a column of data that provides the maximum temperature measured for each product thermocouple during the profile.

MIN TEMPERATURE

Selecting this checkbox will cause the Statistics Table to display a column of data that provides the minimum temperature measured for each product thermocouple during the profile.

MAX SLOPE (+)

Selecting this checkbox will cause the Statistics Table to display a column of data that provides the maximum rising slope calculated for each product thermocouple during the profile.

MAX SLOPE (-)

Selecting this checkbox will cause the Statistics Table to display a column of data that provides the maximum falling slope calculated for each product thermocouple during the profile.

Note: The maximum falling slope will always be expressed as a negative value.

MAX SLOPE (+ OR -)

Selecting this checkbox will cause the Statistics Table to display a column of data that provides the maximum rising or falling slope calculated for each product thermocouple during the profile.

The KIC software will simply compare the absolute value of the maximum rising and falling slopes and display the greater of the two.

Note: If the KIC software determines that the absolute value of the falling slope is greater than that of the rising slope, the value will still be expressed in the Statistics Table as a negative (-) value.

SLOPE UNITS

This is a list menu of two basic references for the slope:

- Degrees/sec – Degrees per second is most commonly used when referencing the slope for small to medium length ovens.
- Degrees/min – Degrees per minute is another option available when referencing the slope for longer ovens.

  Note: Although the X-axis is capable of being referenced in terms of distance (i.e., centimeters, inches, feet, etc.) rather than time, this is not an option in the KIC software for slope references (i.e., degrees/inch) since most process application specifications call for time, which standardizes all slope references independent of which type or length of oven is being used.

SHOW RANGE FOR EACH STATISTIC

Select this checkbox to display a range summary of each column of statistics. The Range is the difference between the highest and the lowest of two or more values in each column and is expressed:

	Peak	Total Time 183
1 U8B1	218.6	59.15
2 U7H1	213.5	62.77
3 BOARD	226.3	58.80
TC Range	12.8	3.97

$$n_{\max} - n_{\min}$$

Note: When only one thermocouple is displayed in the Statistics Table, all ranges will indicate zero.

SHOW MEAN VALUE FOR EACH STATISTIC

Select this checkbox to display a summary of the means for each column of statistics. The Mean is the average of two or more values in each column and is expressed:

	Peak	Total Time 183
1 U8B1	218.6	59.15
2 U7H1	213.5	62.77
3 BOARD	226.3	58.80
TC Mean	219.5	60.24

$$\frac{\sum n}{n}$$

Note: When only one thermocouple is displayed in the Statistics Table, each mean will be equal to the solitary value in it's column.

SHOW STANDARD DEVIATION FOR EACH STATISTIC

Select this checkbox to display a summary of the standard deviations for each column of statistics. The Standard Deviation is a measure of the spread of two or more values in each column from their mean and is expressed:

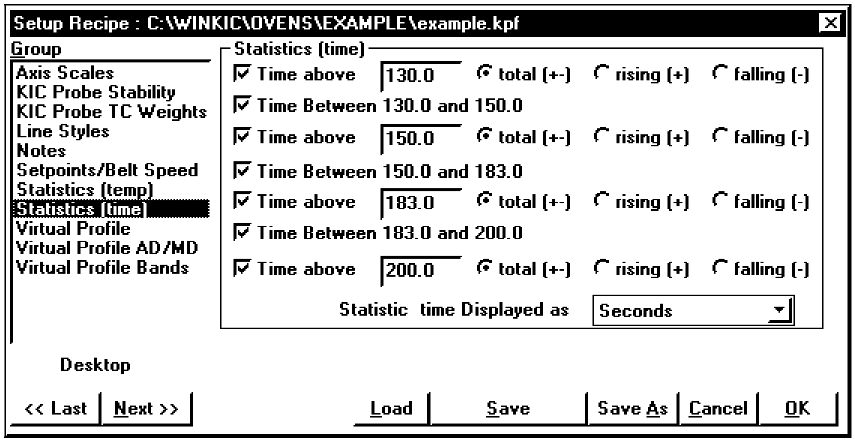
	Peak	Total Time 183
1 U8B1	218.6	59.15
2 U7H1	213.5	62.77
3 BOARD	226.3	58.80
TC SD	6.5	2.20

$$\sqrt{\frac{n\sum x^2 - \left(\sum x\right)^2}{n(n-1)}}$$

Note: When only one thermocouple is displayed in the Statistics Table, no standard deviations will be displayed.

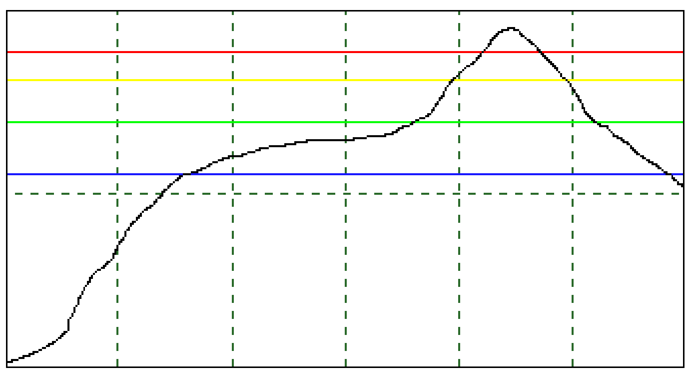
STATISTICS (TIME) GROUP

This group provides the ability to define temperature references with which time is measured.



TIME ABOVE TEMPERATURE

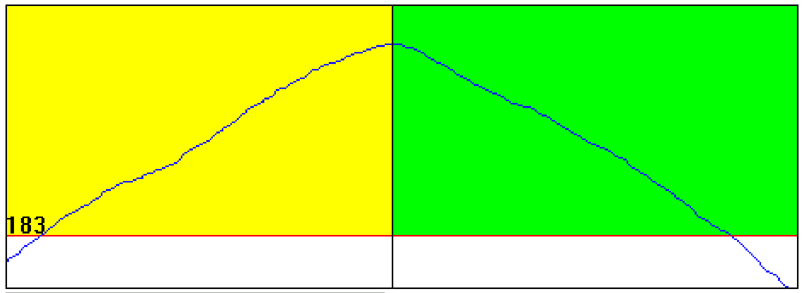
Up to 4 user defined values can be defined to determine how much time the temperature of the product, prediction, or virtual profile is above these values.



To use this feature:

- Select the time scale (minutes or seconds) from the Statistics Time Displayed As list menu.
- Select the checkboxes for the number of reference points to use (up to 4)
- Input the values for the reference points.

- Select how the Time Above will be measured:
  - ✓ **Rising** – Considers only that time where the profile segment rises above the user defined reference temperature.
  - ✓ **Falling** – Considers only that time where the profile segment falls while above the user defined reference temperature.
  - ✓ **Total** – Considers the entire time where the profile segment is above the user defined reference temperature and is the sum of the Rising and Falling times.

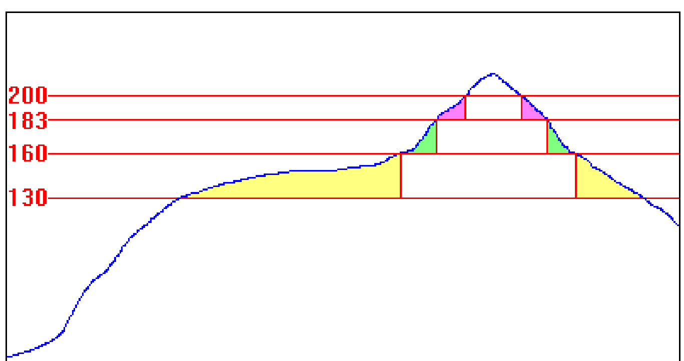


	Rising Time Above 183	Falling Time Above 183	Total Time Above 183
2 U7H1	31.51	31.27	62.77

TIME BETWEEN TEMPERATURE

Up to 3 columns of statistics can be displayed showing the times between the 4 user defined temperature values. To use this feature:

- Select the time scale (minutes or seconds) from the Statistics Time Displayed As list menu.
- Select the checkbox located between the two temperature references desired.

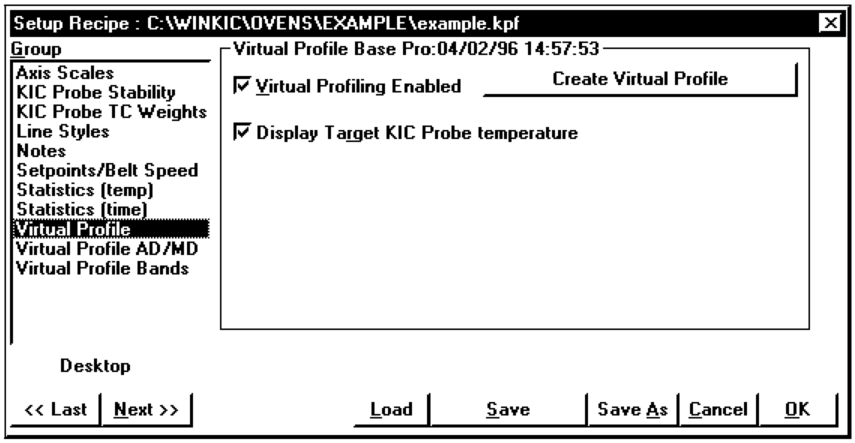


	Time Between 130/160	Time Between 160/183	Time Between 183/200
2 U7H1	125.94	21.78	31.51

VIRTUAL PROFILE GROUP

This group is used to create a new Virtual Profile (VP) or enable an existing Virtual Profile. The Virtual Profile is a unique feature of the KIC software that provides the capability of continuously monitoring the product profile.

Note: The Virtual Profile AD/MD and Virtual Profile Band groups are not available until a Virtual Profile has successfully been created.



CREATE NEW VIRTUAL PROFILE

This button is used to create a new Virtual Profile and is only available for use when the following conditions are met:

- The product profile that was collected "live" (see note). This can be accomplished using one of two methods:
  - ✓ Running a transmitted profile using the SlimKIC, SlimKIC-II or SideKIC Thermal Profiler.
  - ✓ Running a trailing-wire profile from the TPU Traveler port.
- KICprobe temperatures were being collected during the live profile.
- A profile, either live or from history (meeting the previous criteria) is currently displayed on the X/Y-graph.

Note: Data-logged profiles are not currently supported as a means to create a Virtual Profile because this method cannot sync the product profile date/time information with that of the KICprobes.

Virtual Profiling Enabled

This checkbox is used to either disable the Virtual Profile currently in use, or enable a Virtual Profile that has already been created.

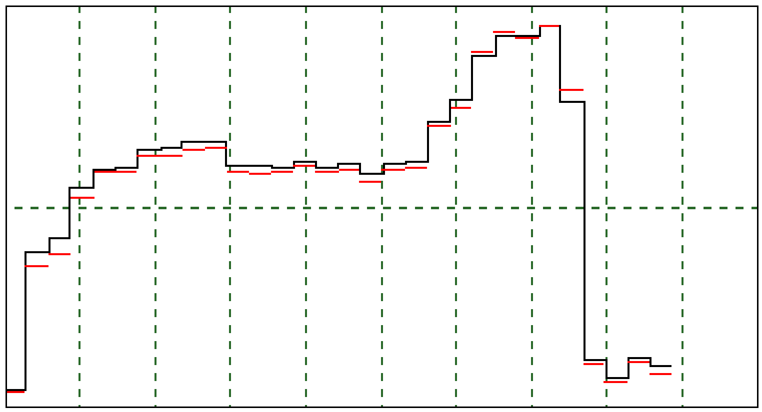
As the KIC software collects temperature and event information over time, any Virtual Profile that was enabled while the data was collected is also associated with that data. When selecting an event from the Browser, the Virtual Profile that was active at the time the data was collect with viewed as well.

By default, this feature is enabled when a Virtual Profile is created.

Display Target KICprobe Temperatures

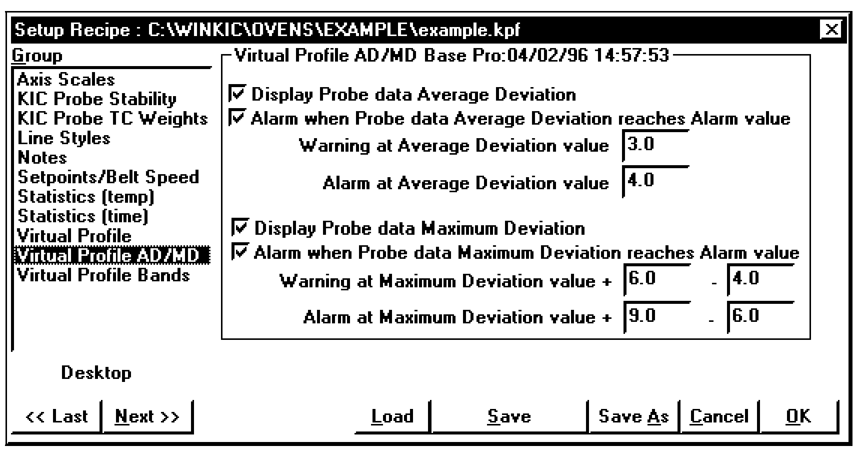
This checkbox is used to display the KICprobe Target temperature on the X/Y-graph. These target temperatures were collected when the profile used to create the Virtual Profile was started. They are a baseline from which the KIC software will determine the deviation values of the current KICprobe temperature readings while the Virtual Profile is running.

By default, this feature is enabled when a Virtual Profile is created. To prevent the Target temperatures from displaying on the X/Y-graph, deselect this checkbox.



VIRTUAL PROFILE AD/MD GROUP

This group is available only after successfully creating a Virtual Profile (VP) from within the Virtual Profile group. The options available in this group allow the user to define the alarms settings for the Average Deviation (AD) and Maximum Deviation (MD).

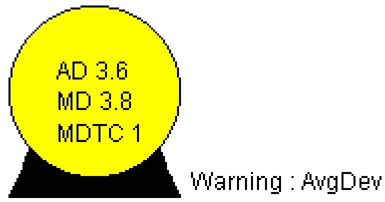


DISPLAY KICPROBE DATA AVERAGE DEVIATION

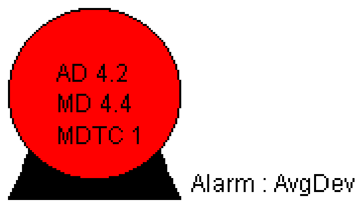
Select this checkbox to have the numerical value of the Average Deviation displayed inside the crystal ball.

AVERAGE DEVIATION ALARM OPTIONS

- **Alarm When KICprobe Data Average Deviation Reaches Alarm Value** – Select this checkbox to activate the software and hardware (if used) alarms if the KICprobe Average Deviation (AD) becomes equal to or greater than the user assigned limitations.
- **Warning at Average Deviation Value** – Enter the value that will be used as the warning (yellow) limit.



- **Alarm at Average Deviation Value** – Enter the value that will be used as the alarm (red) limit.

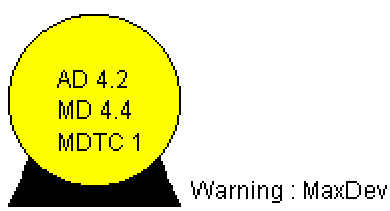


DISPLAY KICPROBE DATA MAXIMUM DEVIATION

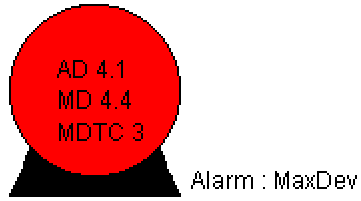
Select this checkbox to have the numerical value of the Maximum Deviation, along with the identity of the KICprobe thermocouple that reported this maximum value, displayed inside the crystal ball.

MAXIMUM DEVIATION ALARM OPTIONS

- **Alarm When KICprobe Data Maximum Deviation Reaches Alarm Value** – Select this checkbox to activate the software and hardware (if used) alarms if the KICprobe Maximum Deviation (AD) becomes equal to or greater than the user assigned limitations.
- **Warning at Maximum Deviation Values** – Enter the high and low values that will be used as the warning limit.



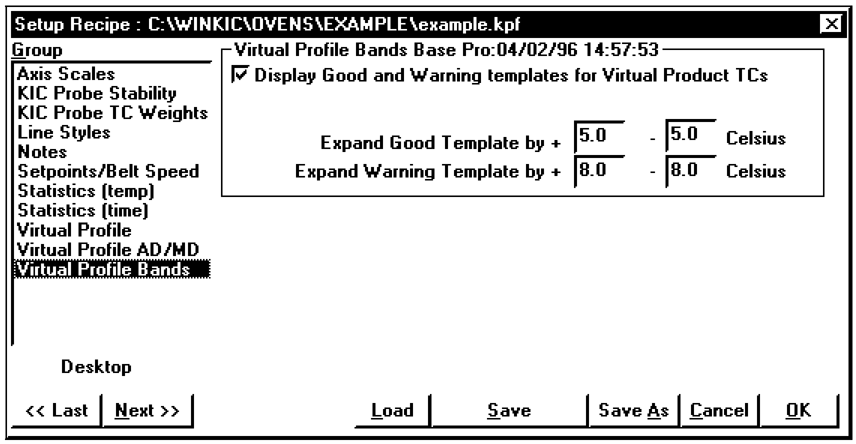
- **Alarm at Maximum Deviation Value** – Enter the high and low values that will be used as the alarm limit.



VIRTUAL PROFILE BANDS GROUP

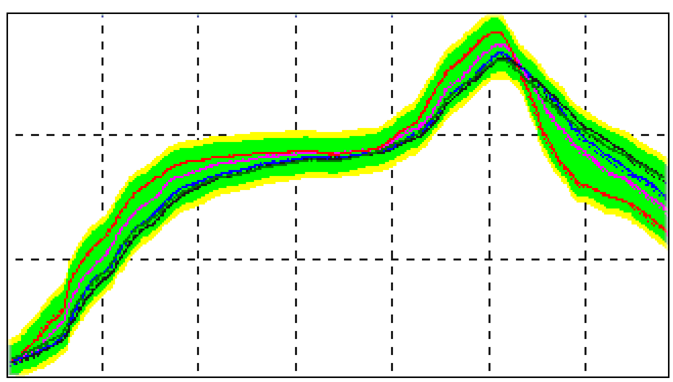
This group provides options for encapsulating the Virtual Profile (VP) within a user defined template that supports the use of a warning (yellow) when any part of the Virtual Profile reaches or exceeds the warning area.

Note: Alarms cannot be based on the movement of the Virtual Profile within the bands.



DISPLAY GOOD AND WARNING TEMPLATES FOR VIRTUAL PRODUCT TCS

- **Expand Good Template by** – Enter the high and low values that will be used to define the width of the area the Virtual Profile should be within when good.
- **Expand Warning Template by** – Enter the high and low values that will be used to define the width of the area extending beyond the good band that will produce a warning if any part of the Virtual Profile falls within it.

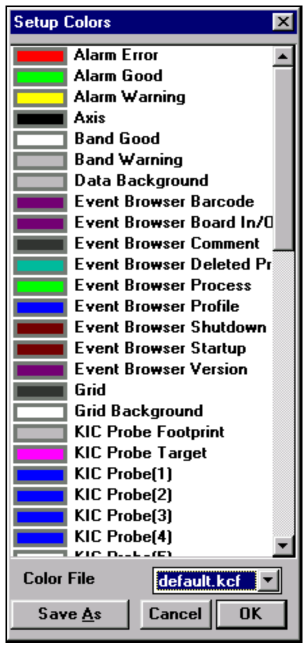


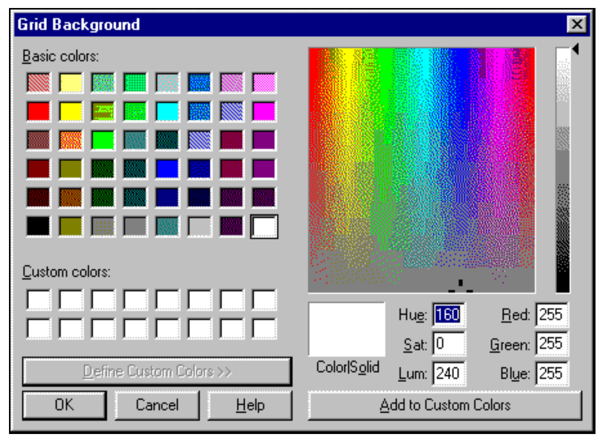
Above is an example of the use of the Virtual Profile bands. For clarity, colors were reassigned (Setup/Colors dialog box) to show the "good" band as green and the "warning" band as yellow.

Color

The colors of most items on the display can be changed to suit the preference of the user. These colors can further be save to a file. An unlimited number of color schemes can be stored.

To access this feature, choose **Color** from the setup list menu or press ALT+S+L. When selected, the **Setup Colors** dialog box will appear.





To change the color attributes of any item on the list, simply use the mouse to double-click on that item. The basic Windows color assignment dialog box will appear.

Depending on the color resolution of the monitor and video card in your computer, you may be able to choose anywhere from 256 to 16 million different colors.

Below is a list of items on the color list, followed by a brief description of their functions:

- **Alarm Error** – This is the color that the Virtual Profile crystal ball will change to when the data exceeds the settings you defined.
- **Alarm Good** – This is the color that the Virtual Profile crystal ball will maintain when the temperature data has not exceeded your settings for a warning condition.
- **Alarm Warning** – This is the color that the Virtual Profile crystal ball will change to when the data exceeds the warning settings you defined, but not the alarm settings.
- **Axis** – Refers to the color of the X and Y axis bars, fonts, and graph border.
- **Band Good** – This is the color of the Virtual Profile Good Band.
- **Band Warning** – This is the color of the Virtual Profile Warning Band.
- **Data Background** – This is the color of the main screen background, excluding the X/Y-graph.

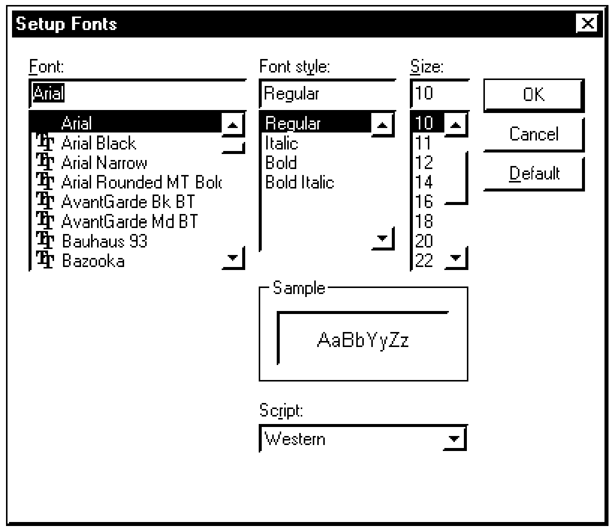
- **Event Browser Barcode** – This will be the text color of all barcode entries in the Event Browser.
- **Event Browser Board In/Out** – This will be the text color of all entries in the Event Browser that show a board entering and/or exiting the oven.
- **Event Browser Comment** – This will be the text color for all comments on the Event Browser.
- **Event Browser Deleted (hidden) Profile** – This will be the text color for all hidden profiles on the Event Browser.
- **Event Browser Process** – This will be the text color for all loaded recipes on the Event Browser.
- **Event Browser Profile** – This will be the text color for all profile on the Event Browser.
- **Event Browser Shutdown** – This will be the text color for all oven shutdowns on the Event Browser.
- **Event Browser Startup** – This will be the text color for all oven startups on the Event Browser.
- **Event Browser Version** – This will be the text color for the Event Browser version.
- **Grid** – This is the color of the X and Y grid lines.
- **Grid Background** – This is the color of the background of the x-y grid.
- **KICprobe Footprint** – This is the color of the temperature range of each individual KICprobe TC over time.
- **KICprobe Target** – This is the color of the KICprobe Virtual Profile Target temperature. It is from this line that the Average Deviation (AD) and Maximum Deviation (MD) are measured.
- **KICprobe (1)** – This is the color of the 1st KICprobe.
- **KICprobe (2)** – This is the color of the 2nd KICprobe.
- **KICprobe (3**) – This is the color of the 3rd KICprobe.
- **KICprobe (4)** – This is the color of the 4th KICprobe.
- **KICprobe (5)** – This is the color of the 5th KICprobe.
- **KICprobe (6)** – This is the color of the 6th KICprobe.
- **KICprobe (7)** – This is the color of the 7th KICprobe.
- **KICprobe (8)** – This is the color of the 8th KICprobe.
- **KICprobe (9)** – This is the color of the 9th KICprobe.
- **KICprobe (A)** – This is the color of the 10th KICprobe.
- **Live Background** – This is the color of the screen background when the main screen is displaying live data. This is also a queue that helps remind you which mode you're in.
- **Oven** – This is the color for the oven foreground outline.
- **Oven Hidden Lines** – This is the color for the oven background outline.
- **Oven Start/End** – This is the color for the oven profile start and end marks.
- **Pointer** – This is the color of the Pointer lines.
- **Product** – This is the color of the static product image.
- **Product TC 1** – This is the color assigned to the 1st Product TC.
- **Product TC 2** – This is the color assigned to the 2nd Product TC.
- **Product TC 3** – This is the color assigned to the 3rd Product TC.

- **Product TC 4** – This is the color assigned to the 4th Product TC.
- **Product TC 5** – This is the color assigned to the 5th Product TC.
- **Product TC 6** – This is the color assigned to the 6th Product TC.
- **Product TC 7** – This is the color assigned to the 7th Product TC.
- **Product TC 8** – This is the color assigned to the 8th Product TC.
- **Product TC 9** – This is the color assigned to the 9th Product TC.
- **Product TC 10** – This is the color assigned to the 10th Product TC.
- **Product TC 11** – This is the color assigned to the 11th Product TC.
- **Product TC 12** – This is the color assigned to the 12th Product TC.
- **Product TC 13 (maxtemp)** – This is the color assigned to the "13th Product TC", which is reserved by KIC software to measure the setting of the maximum temperature potentiometer on the SlimKIC.
- **Product TC 14 (battery)** – This is the color assigned to the "14th Product TC", which is reserved by KIC software to measure the voltage condition of the SlimKIC internal 9 volt battery.
- **Product TC 15 (internal)** – This is the color assigned to the "15th Product TC", which is reserved by KIC software to measure the internal temperature of the SlimKIC.
- **Setpoints Bottom** – This is color of the oven's bottom zone setpoints.
- **Setpoints Top** - This is the color of the oven's upper zone setpoints.
- **Statistic Temperature 1** – This is the color of the horizontal line drawn across the x-y graph indicating the target of the 1st temperature tracked by the statistics table.
- **Statistic Temperature 2** – This is the color of the horizontal line drawn across the x-y graph indicating the target of the 2nd temperature tracked by the statistics table.
- **Statistic Temperature 3** – This is the color of the horizontal line drawn across the x-y graph indicating the target of the 3rd temperature tracked by the statistics table.
- **Statistic Temperature 4** – This is the color of the horizontal line drawn across the x-y graph indicating the target of the 4rd temperature tracked by the statistics table.
- **Zones** – This is the color of the X-axis lines used to delineate the oven zones.

Fonts

The fonts displayed on the screen can be changed to suit the users preference. By default, these fonts will also be used on all reports generated from the KIC software. The fonts available for use depend on the Windows operating system setup.

To change the fonts, choose **Fonts** from the setup list menu or press ALT+S+F. When selected, the **Setup Fonts** dialog box will appear.



FONT

From the list of available fonts, select the font to appear on the KIC software display. This font will be used throughout all text items on the display. The default font is Arial.

Note: Only text fonts (not symbols) can be used.

FONT STYLE

From the list of font styles, select the style to be applied to the selected font. The default style is Regular.

SIZE

From the list of font sizes, select the size to be applied to the selected font. The default size is 10.

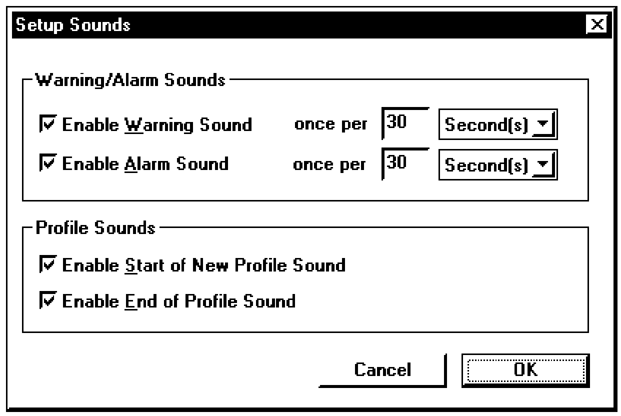
Note: Because of the way Windows fonts interact with varying Windows applications, video drivers and some video monitors, the selected font sizes may not correctly display to the desired size. The video driver used for the computer should never have "large fonts" selected from the Windows control panel.

Sounds

If the computer used to run the KIC software has a sound card available, standard Windows wave files can be used to create audible sounds based of four events:

- **Warnings** – If using a SlimKIC or SlimKIC-II Thermal Profiler, the warning sound is also used to alert the user when the internal temperature achieves 80ºC.
- **Alarms** – If using a SlimKIC or SlimKIC-II Thermal Profiler, the alarm sound is also used to alert the user when the internal temperature achieves 100ºC.
- **Profile Starts**
- **Profile Completions**

To access the sound features, choose **Sounds** from the setup list menu or press ALT+S+U. When selected, the **Setup Sounds** dialog box will appear.



WARNING/ALARM SOUNDS

These options provide the ability to enable or disable the Warning and Alarm sounds as well as define the frequency with which the sounds should occur.

Enable Warning Sound

Select this checkbox to have the KIC software emit a sound each time a warning condition is detected. By default, a warning condition is associated with the color yellow on the crystal ball.

Input the frequency with which the sound should be emitted by first selecting the time reference from the list menu (i.e., seconds, minutes, hours), then inputting the value.

Enable Alarm Sound

Select this checkbox to have the KIC software emit a sound each time an alarm condition is detected. By default, an alarm condition is associated with the color red on the crystal ball.

Input the frequency with which the sound should be emitted by first selecting the time reference from the list menu (i.e., seconds, minutes, hours), then inputting the value.

PROFILE SOUNDS

These options provide the ability to enable or disable sounds used as an audible queue when running a temperature profile. No frequency is need since there are only two distinct events that occur (i.e., start and end).

Enable Start of New Profile Sound

Select this checkbox to have the KIC software emit a sound each time a profile is started.

Enable End of Profile Sound

Select this checkbox to have the KIC software emit a sound each upon the completion of a profile.

CUSTOMIZING THE SOUNDS

Customization of the sounds is easily performed by either using existing sounds or creating them, then modifying the WINKIC.INI file to include them. The KIC software expects to find the sound files within the WinKIC directory on the local hard drive.

To use alternative sounds within the KIC software, open the WINKIC.INI file using a standard ASCII text editor such as NOTEPAD. In the [Sounds] section (toward the bottom) remove the wave files assigned and type in the desired sound.

Example:

[Sounds]

Start=mysound.wav

After editing the WINKIC.INI file, it must be saved as a text file.

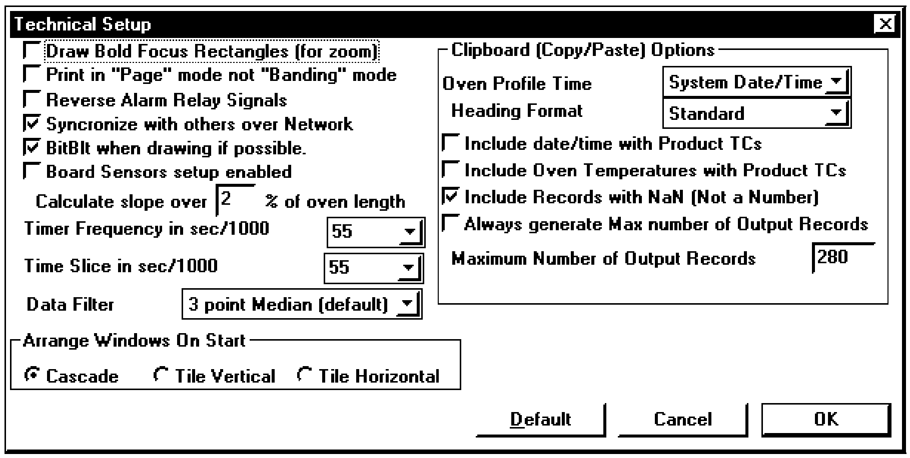
Note: If the WINKIC.INI file becomes corrupted, delete it. The next time the KIC software application is started in will create a new default WINKIC.INI file. The information in the KIC software's Hardware Input Monitor will need to be reconfigured to the correct settings.

Technical

The Setup Technical dialog box provide support for settings advanced settings that impact the behavior of the KIC software application.

These options are similar to the Global preference options in that they affect the functionality of all operations in the KIC software. The difference is that apart from the Global Preferences, the Technical options are more advanced settings that should, under normal circumstances, never be changed once set and should only be changed by when necessary and by someone who fully understands their impact.

To access the technical features, choose **Technical** from the setup list menu or press ALT+S+T. When selected, the **Technical Setup** dialog box will appear.



DRAW BOLD FOCUS RECTANGLES (FOR ZOOM)

When checked, will created a bolder zoom border. This feature is best suited for laptop computers with LCD (liquid crystal display) screens that are often times difficult to read. The default for this feature is OFF, or unchecked.

PRINT IN “PAGE” MODE NOT “BANDING” MODE

If this checkbox is selected, the KIC software will perform a Page mode print rather than Banding mode print. The default mode is Page.

Band mode allows the printer driver to request printing of individual bands from the KIC software. These tend to be 1 inch so the printer driver will ask the KIC software to draw 11 individual bands separately.

In Page mode, the printer drivers asks the KIC software to draw the page once, and the printer driver (or printer) is responsible for separating it into bands if required.

If you have problems printing to a Postscript™ or HPGL printer in Band mode, use the Page mode. The default for this feature is ON, or checked.

TIP: If problems are encountered when attempting to generate a printout, try selecting this checkbox (Page mode) and try to print again. If this clears the printing problem, leave this checkbox selected.

REVERSE ALARM RELAY SIGNALS

When unchecked, the logic of the KIC Alarm Relay is low, or NORMALLY OFF, when no alarm conditions are detected in the KIC software. When checked (reversed), the logic of the KIC Alarm Relay is high, or NORMALLY ON, when no alarm conditions are detected in the KIC software. This feature allows the user greater latitude in developing control applications that are based on the KIC alarm limits. The default for this feature is OFF, or unchecked.

USE IDLE CALLS

By default the KIC software uses system idle calls to do some of it's processing (data collection, statistical processing, and screen update). On some slower computers, or if other applications are running, you may notice the system get sluggish, or take a long time to do simple tasks such as displaying a menu or a dialog box. If this happens, disable the Use Idle Calls by deselecting the check-box. The default for this feature is ON, or checked.

SYNCHRONIZE WITH OTHERS OVER NETWORK

By default the KIC software will attempt to synchronize itself with other servers and workstations when logged onto a Network. If you have in incorrectly configured network, disabling this feature will allow the KIC software to run.

BITBLT WHEN DRAWING IF POSSIBLE

With BitBlt on (checked), the KIC software will perform screen writes to a computer bitmap in memory first, then send the entire bitmap to the video card at one time, preventing bothersome screen flickers from occurring. With BitBlt off (unchecked), all screen writes go directly to the video card.

By default the KIC software will detect whether or not your particular video card can support this 16 bit version of BitBlt. You can force the checkbox on or off if you choose. If you are having problems with the screen flickering during redraws, see if this box is unchecked.

Note: Windows NT cannot support this 16 bit version of BitBlt.

TIMER FREQUENCY IN SEC/1000

The KIC software uses the system timer to give itself time to do processing (including data collection). The default is 55 milliseconds, which is about 18 calls/second. On slower computers, try values of about 500 milliseconds or 2 calls/second.

TIME SLICE IN SEC/1000

This gives the KIC software a guideline as to how long it should run each time it is given an opportunity. The default value is 55 milliseconds.

Warning: Avoid setting this value higher than the Timer Frequency.

DATA FILTER

Data filters are used as a method of automatically eliminating outlying data that can occur when collecting data.

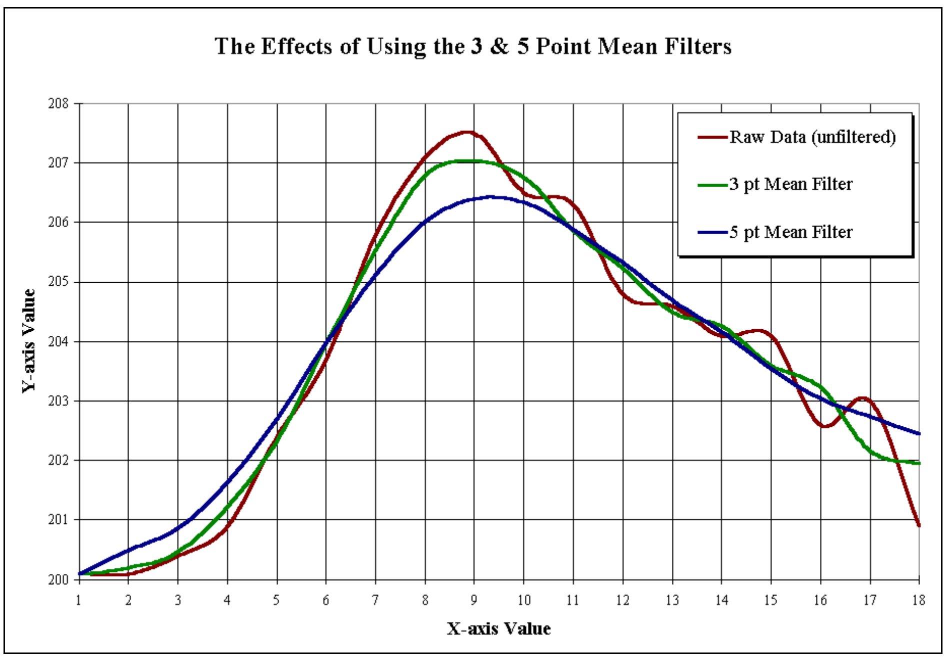
The KIC software provides six data filters:

- None – All outlying data will be included in the X/Y-graph display.
- 3 Point Mean
- 5 Point Mean
- 3 Point Median (default)
- 5 Point Median
- 5 Point Combo – This is a combination of the 5 point Median and 3 point mean filters.

Note: Any changes made to the data filter do not take affect until the KIC software has be restarted.

3 POINT MEAN

The data point and one point from each side (total of 3) are averaged to create the point to be plotted on the x-y graph. This method will effectively "smooth-out" the data. The red plot is the raw data, the green plot is the same data after a 3 point mean filter has been applied.



Example of using 3 and 5 point mean filters.

5 POINT MEAN

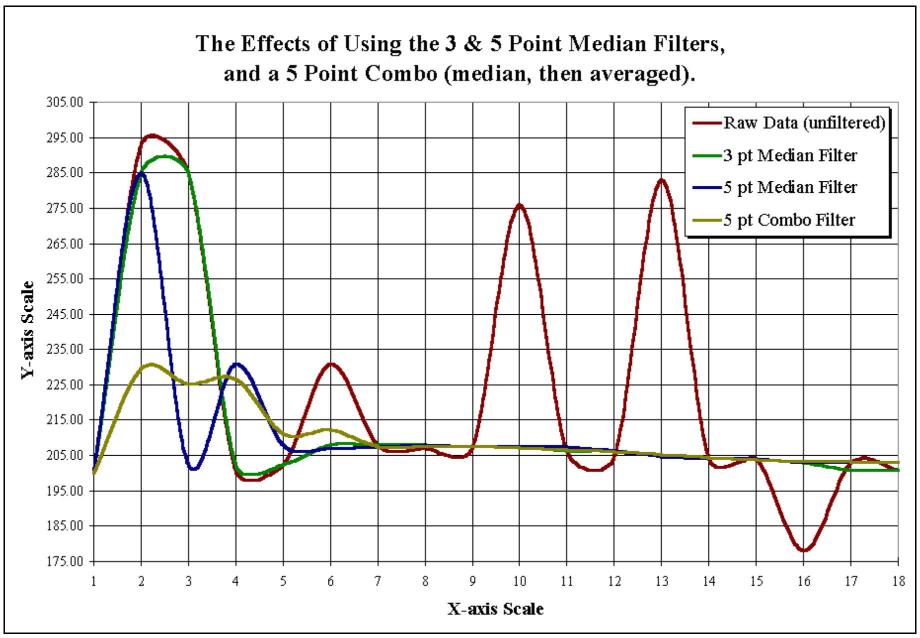
The data point and two points from each side (total of 5) are averaged to create the point to be plotted on the x-y graph. This method will effectively "smooth-out" the

data with moderate skewing of the data. The red plot is the raw data, the blue plot is the same data after a 5 point mean filter has been applied.

3 POINT MEDIAN (DEFAULT)

The data point and one point from each side are “sorted”. The middle point is selected. This will reduce “spikes” in the data. The red plot is the raw data, the green plot is the same data after a 3 point median filter has been applied.

Example: Consider the following data points: 3, 127, 5. If we sort the data points we have 3, 5, 127. The middle point is 5. A numerical value of 5 will be used to plot the data point. This method effectively excludes the data value of 127 from being used, thus avoiding the “spike” this data point would have caused on the X/Y-graph.



Example of using 3 and 5 point median filters and a 5 point combo filter

5 POINT MEDIAN

The data point and two points from each side are “sorted”. The middle point is selected. This will reduce “spikes” in the data. The Red plot is the raw data, the Blue plot is the same data after a 5 point median filter has been applied.

Example: Consider the following data points: 3, 3000, 5, 2000, 7. If we sort the data points we have 3, 5, 7, 2000, 3000. The middle point is 7. A numerical value of 7 will be used to plot the data point. This method effectively excludes the data values of 2000 or 3000 from being used, thus avoiding the “spike” these data points would have caused on the X/Y-graph.

5 POINT COMBO

First a 5 point median filter is applied, then the middle 3 points are averaged in a 3 point mean filter. The Red plot is the raw data, the Gold plot is the same data after a 5 point combo filter has been applied.

CLIPBOARD (COPY/PASTE) OPTIONS

OVEN PROFILE TIME

If you are copying the KICprobe footprint data only, then this will determine how the system date/time is written to each record. The default is **System Date/Time**.

HEADING FORMAT

This option is either **None** or **Standard**. When **Standard** is selected, the copied data will include heading information for identification purposes. The default is **Standard**.

INCLUDE DATE/TIME WITH PRODUCT TCS

When checked, this will display the exact time of each Product TC record. When not checked, the time will be relative in the units displayed on the screen (i.e., inches, feet, minutes, seconds, etc.). The default is off, or unchecked.

INCLUDE OVEN TEMPERATURES WITH PRODUCT TCS

This feature will add a column of KICprobe oven temperature data for each product TC when copying and pasting Product TCs to another application. The KICprobe temperatures will be the ones' taken when that Product TC is at the specific point in the oven. The default is off, or unchecked.

INCLUDE RECORDS WITH NAN (NOT A NUMBER)

By default we include records which have no data in some of the columns. This is because we may not have a KICprobe oven temperature for all Product TC points. Product TC profiles include regions where no KICprobes exist, such as the cooling zone. If you cannot deal with the "NaN" values in your specific application, simply uncheck this box to remove records with NaN values. The default is off, or unchecked.

MAXIMUM NUMBER OF OUTPUT RECORDS

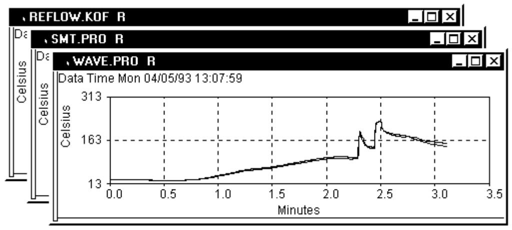
This will set the maximum number of output records when copying and pasting KICprobe data. The default is 280 records.

ARRANGE WINDOWS ON START OPTIONS

How two or more oven files are oriented on the screen after starting the KIC software is determined here. The options are:

CASCADE

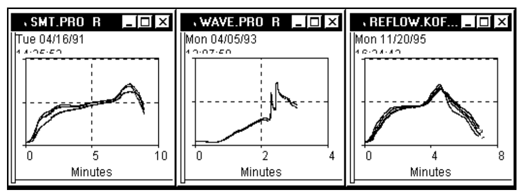
The oven files are cascaded, one on top of the other. This is the default.



Example of cascaded windows

TILE VERTICAL

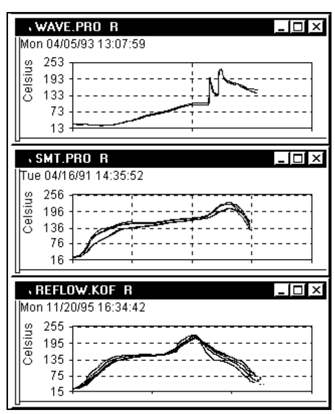
The oven files are tiled vertically, or left and right.



Example of vertically tiled windows

TILE HORIZONTAL

The oven files are tiled horizontally, or top to bottom.

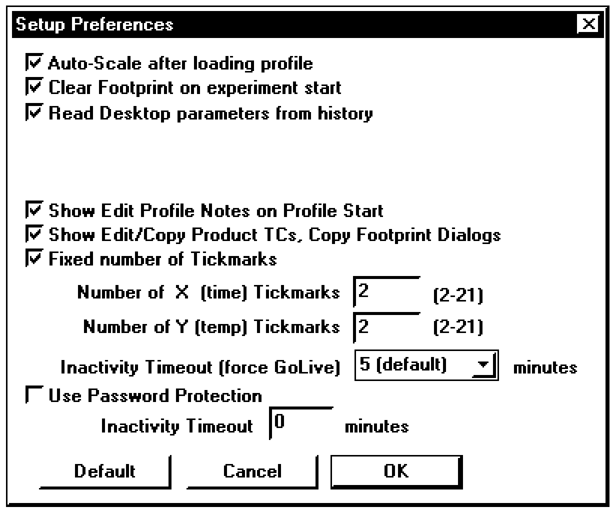


Example of horizontally tiled windows

Global Preferences

These options impact the preferences for the way all files viewed in the KIC software function. For instance, having the Clear Footprint on Experiment Start checkbox selected will cause the Footprints on the KICprobes of any oven to be automatically cleared when starting a profile.

To access the global preference features, choose **Global Preferences** from the setup list menu or press ALT+S+G. When selected, the **Setup/Preferences** dialog box will appear.



AUTO-SCALE AFTER LOADING PROFILE

When this checkbox is selected (default), the scales of the X/Y-graph will automatically re-scale to the sizes needed to include all data capable of being display on the graph. This includes the product profile, the KICprobe data, the oven setpoints, etc.

Deselecting this checkbox provides the ability to define the X and Y scales to the precise dimensions defined using either the Setup Recipe  dialog box or the Zoom-in  tool. The dimensions of the X and Y scales will remain as set unless one or more the following occur:

- The Zoom-in  tool is used. This will redefine the new X/Y-scale dimensions.
- The Zoom-out  tool is used. This will cause the X/Y-scale dimensions to “back-off” to the last zoom level and will redefine the new X/Y-scale dimensions.
- The Autoscale  tool is used. This will cause the X/Y-scale dimensions to automatically fit all outlying data into the viewable display of the X/Y-graph and will redefine the new X/Y-scale dimensions.
- The Desktop from History feature is enabled and a subsequent profile that contains data outlying the user defined dimensions is selected from the Event Browser. This will redefine the new X/Y-scale dimensions.

Note: When using fixed X and Y scales, the Fixed Number of Tickmarks feature can be used to additionally to define the number of major axis’s used.

CLEAR FOOTPRINT ON EXPERIMENT START

By default this feature is always ON, and clears the current Footprint (temperature range variation of each of the KICprobe thermocouples) at the start of the profile.

This allows you to observe and measure the amount of normal temperature variations per KICprobe thermocouple, caused directly by the mere act of passing the product through the oven. This can help you quickly gage the oven's temperature response to the boards thermal mass.

When deselected, the current Footprint will remain on the graph whenever a profile is started.

READ DESKTOP PARAMETERS FROM HISTORY

By default this feature is checked and will cause the exact desktop setups used during the conduct of a profile previously run to appear along with the profile data when you select that profile from the Event Browser. This can help ensure that you are seeing the exact same setups as were used when the profile was initially run.

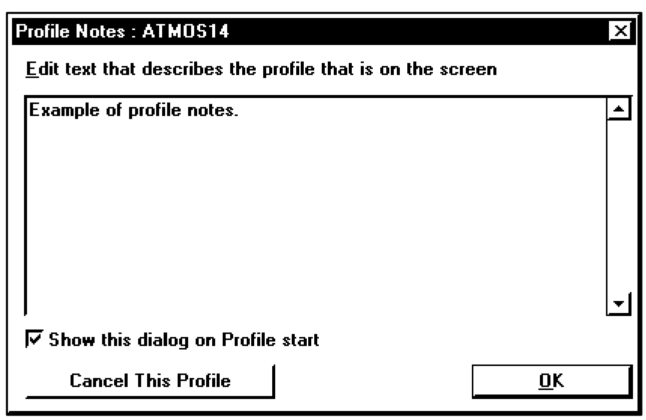
- The Desktop Parameters consist of the following items:
- Axis Scales settings
- KICprobe Stability settings (if KICprobes are used and setup)
- KICprobe TC Weights (if KICprobes are used and setup)
- Lines Style settings
- Statistics settings (both temperature and time)
- Virtual Profile setup (if KICprobes are used and Virtual Profile was created)
- Virtual Profile AD/MD settings (if KICprobes are used and Virtual Profile was created)
- Virtual Profile Band settings (if KICprobes are used and Virtual Profile was created)

When deselected, the desktop setups that are currently in use will instead be applied to each event selected from the Event Browser.

SHOW EDIT PROFILE NOTES ON PROFILE START

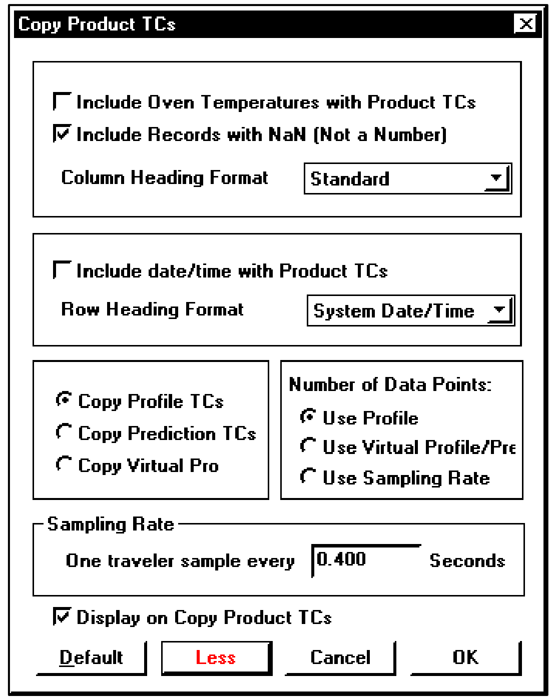
By default this feature is checked and will cause the Profile Notes dialog box to appear at the start of each profile run.

Note: One exception to this rule is when you are using Continuous Profiling, found in the Setup/Oven/More dialog box. When used, Continuous Profiling will automatically repeat the profiling cycle unattended, and will input numerical integers into the Profile Notes in lieu of user input text.



SHOW EDIT/COPY PRODUCT TCS, COPY FOOTPRINT DIALOGS

By default this feature is checked and will cause the **Copy Product TCs** dialog box to appear whenever the user copies the product thermocouples (ALT+E+C or CTRL-C).



FIXED NUMBER OF TICKMARKS

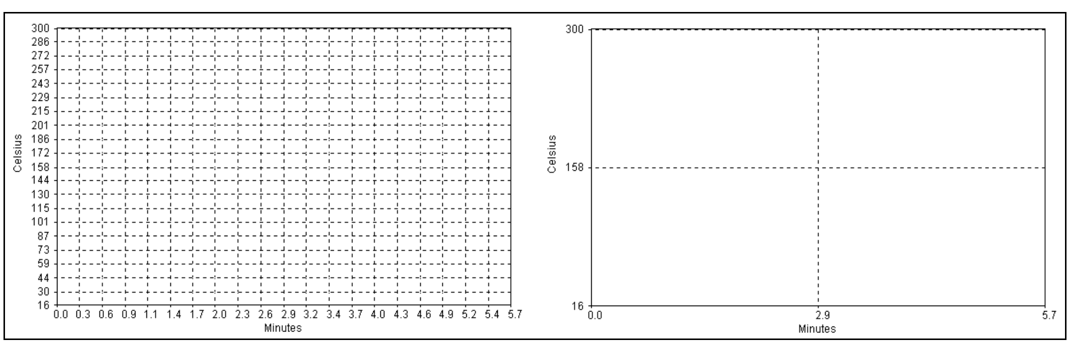
Select this checkbox if you wish to define a fixed set of X and Y axis's on the graph display. When selected, the **Number of X(Time) Tickmarks** and **Number of Y (Temp) Tickmarks** fields will display in the **Setup Preferences** dialog box.

NUMBER OF X (TIME) TICKMARKS

Input the number of major X axis's that you want to see displayed and remained fixed on the graph. The minimum is 2 and the maximum is 21. This number includes the ends (left and right) of the graph.

NUMBER OF Y (TEMP) TICKMARKS

Input the number of major Y axis's that you want to see displayed and remained fixed on the graph. The minimum is 2 and the maximum is 21. This number includes the ends (upper and lower) of the graph.



INACTIVITY TIMEOUT (FORCE GOLIVE)

Whenever you examining an event from the Event Browser, you're in "history mode". While in the history mode, the KIC software is not capable of alerting you to a problem that currently exists in the "live mode".

To prevent accidentally leaving the KIC software in the history mode, this Inactivity Timeout will force the KIC software back into the live mode whenever any inactivity with the keyboard or mouse exceeds the amount of time. The default is 5 minutes.

To change the Inactivity **Timeout (force GoLive)** value, click on the list menu and select the desire time limit. Up to 30 minutes can be set before the system times out. To completely disable this feature, select 0 (zero).

USE PASSWORD PROTECTION

Only those with Administrator privileges have access to this feature. The checkbox, when selected, switches the KIC software from using **Function Levels** to using **Privilege Levels** when normally accessing the software.

With the Privilege Levels on, the **Logon** and **Logoff** commands will be made available on the File list menu.

INACTIVITY TIMEOUT

This inactivity timeout forces the **Privilege Level** back down to **View Only** whenever any inactivity with the keyboard or mouse exceeds the amount of minutes input in this field.

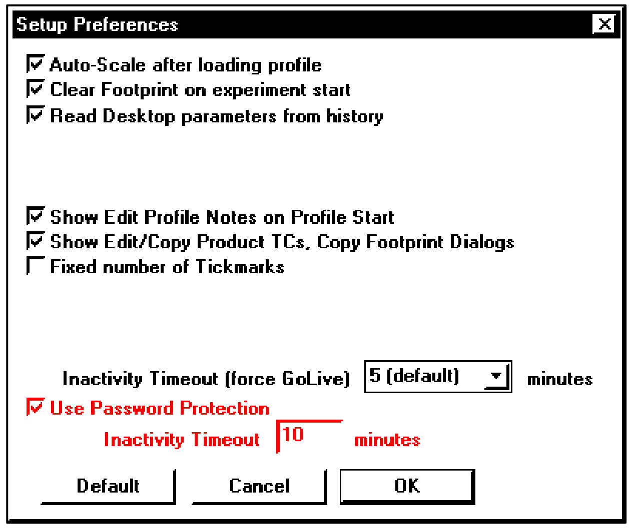
This is a minor security measure that prevents others from accessing the KIC software with your Privilege Level should you fail to Logoff the system. The maximum number of minutes is 546. A value of 0 (zero) will completely disable the Inactivity Timeout feature.

Users

This feature will provide a means of creating new users, passwords and privilege levels and is only accessible to persons with ADMIN level privileges.

This command will not appear on the Setup list menu until the Administrator enables the Use Password Protection checkbox found in the **Global Preferences** dialog box, which also requires ADMIN level privileges to access.

Enabling the Privilege Levels



To enable Privilege Levels you must have Administrator level access.

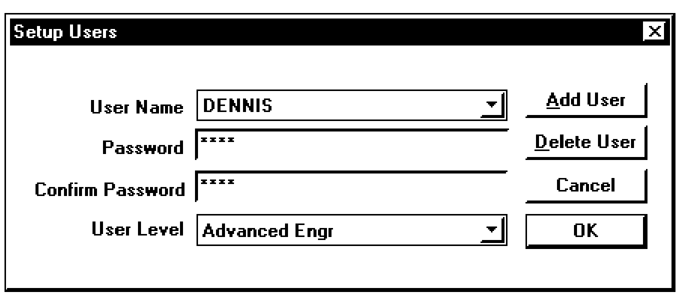
- Logon as the Administrator.
- Select **Global Preferences** from the **Setup** list menu (ALT+S+G). The **Global Preference** dialog box will appear.
- Select the **Use Password Protection** checkbox.

- Input an **Inactivity Timeout** limit (in minutes). This will force the KIC software down to the View Only level if inactivity with the KIC software exceeds this limit.

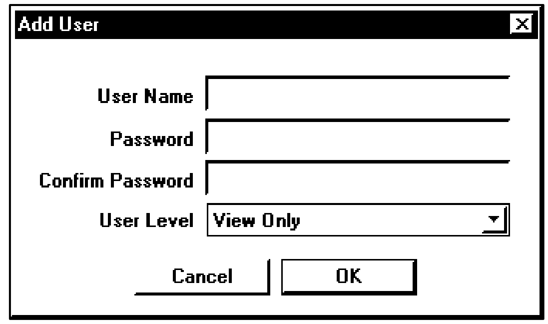
  A value of 0 (zero) will disable the Inactivity Timeout feature. The maximum value that can be used is 546 minutes.
- Click on the OK button. The **Privilege Levels** are now enabled**.**

Once the Privilege Levels have been enabled, the Administrator is capable of creating individual users, groups of users, passwords and user levels.

- Logon as the Administrator.
- Select **Users** from the **Setup** list menu (ALT+S+E). The **Setup Users** dialog box will appear.



Adding a Privilege Level User



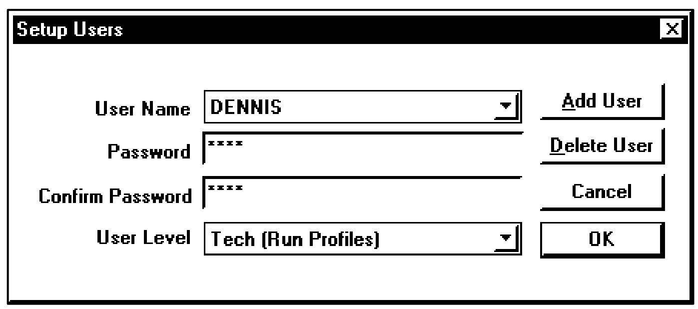
- To add a user, click on the **Add User** button from the **Setup Users** dialog box. The **Add User** dialog box will appear.
- Input the **User Name** – generally, these names should be associative and easy for the user to remember.
- Input the **Password**, then input the same password in the **Confirm Password** field. If these two entries are not exactly the same values, you will not be able to save this users setup.
- From the **User Level** list menu, select the Privileges the user may have access to.

  Note: Remember, no matter which Privileges are selected, the user be able to, at their option, temporarily reselect a lower Privilege level than that assigned through the Current Level dialog box.

- Click on the **OK** button. This user assignment is now available.

  Note: It's a good practice to first test new user assignments to ensure that you've provided access to those tools needed to accomplish their tasks.

Editing a Privilege Level User



- From the **User Name** list menu, select the user you wish to change.
- Make any changes to the **Password** and/or **User Level**, then select the OK button when finished.

Deleting a Privilege Level User

- Select the User Name to delete.

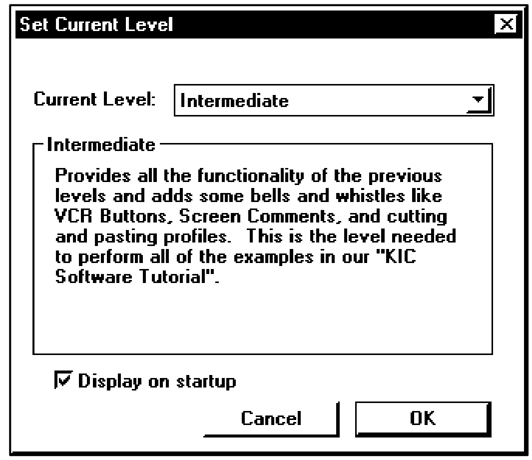
Click on the Delete User button, then click on OK when finished.

Current Level

The KIC software contains a rich set of tools, some of which are often only used by a few customers in a corner of the industry. Little used tools can now be hidden so the typical user doesn't have to wade through them to get to the more common commands.

Using Function Levels

These levels are pre-assigned in the KIC software and cannot be changed. When password protection (Privilege Levels) has not been implemented by the Administrator, they offer an expanded or reduced functionality of the KIC software to match that of the users comfort level.



The user can choose between 5 different **Function Levels**:

- Limited
- Basic
- Intermediate
- Advanced
- Administrator

To select a Current Level, select **Current Level** from the **Setup** list menu or press ALT+S+C. The **Setup Current Level** dialog box will appear.

LIMITED

The "Limited" function level provides all the tools necessary to perform a quick profile. The Zoom, Pointer, and Statistics tools help to analyze the profile are all easily accessibly in this level. This is an excellent choice for profiling batch ovens, rework stations, and other processes where the Profile Prediction and Virtual Profiling tools are not applicable.

BASIC

The "Basic" function level provides all the functionality found at the "Limited" level and includes Profile Prediction and Virtual Profiling. This is the default level for first time users (if this is the first time the KIC Software is being installed on this computer).

INTERMEDIATE

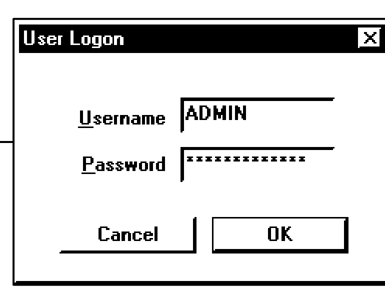
The "Intermediate" level provides all the functionality of the previous levels and adds some bells and whistles like VCR Buttons, Screen Comments, and cutting and pasting profiles. This is the default level if a previous version of the KIC software has been installed on this computer. This is also the level that is necessary to perform all of the examples in our "KIC Software Tutorial".

ADVANCED

The "Advanced" level provides all the functionality of the previous levels and adds a plethora of specialized tools for unique applications. If you can't find the functionality you're looking for, switch to the "Advanced" level and look again.

ADMINISTRATOR

The "Administrator" level is used to enable password protection and define user names and



passwords. This level is not needed unless password protection will be used.

If the Function Level you select is the Administrator level, the **User Logon** dialog box will appear. The default administrator user name is ADMIN, the default password is KOB.

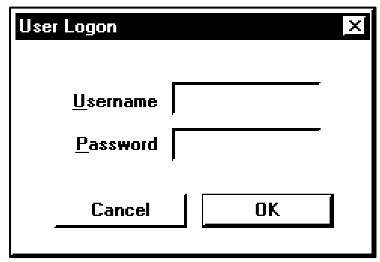
The password for the ADMIN level should be changed by the Administrator as soon as possible once the KIC software has been successfully been installed.

Note: Of all of the Function Levels, only the ADMIN level requires the use of a password to access because it provides the doorway to the Privilege Levels, which ultimately permit the assignment of users, passwords and privilege levels.

Display on Startup

Select this checkbox to cause the Current User Level dialog box to appear whenever the KIC software is started.

Using Privilege Levels



When the administrator assigns a user name and password, they must also assign the privilege level. When password protection is enabled, a user must enter their name and password before they can use the software.

The administrator can choose between 7 different **Privilege Levels**:

- View Only
- Operator (Load Recipes)
- Tech (Run Profiles)
- Sr. Tech
- Engineer (Create Recipes)
- Advanced Engr.
- Administrator

To access your assigned Privilege Level, select **Logon** from the File list menu, or use ALT+F+L. The **User Logon** dialog box will appear.

Input your assigned **Username** and **Password**, then click the OK button. This procedure is common throughout all Privilege Levels, including the Administrator level.

VIEW ONLY

"View Only" is the lowest level and allows the user to look at the current live screen and any historical data available in the Event Browser. However, they cannot Hide profiles, and they cannot change the Recipe, run a profile, or change the history in any way. This is useful if the user responsibilities are merely to watch for alarms and report them.

OPERATOR (LOAD RECIPES)

"Operator (Load Recipes)" is the next privilege level and it allows all of the privileges of the previous level and also allows recipes to be loaded. This is useful if the user

responsibilities are simply to make sure that the correct Recipe is loaded in the KIC software and report any alarms.

TECH (RUN PROFILES)

"Tech (Run Profiles)" is the next privilege level and it allows all of the privileges of the previous level and also allows the user to run profiles. This is useful if the user responsibilities are to make sure the correct recipe is loaded, and to run a product profile to verify the process.

SR. TECH

"Sr. Tech" is the next privilege level and it allows all of the privileges of the previous level and also allows the user to update the virtual profile in a recipe. This is useful if the user responsibilities are to run a profile whenever the Virtual Profile indicates an alarm. If the actual profile is within tolerance, the user can create a new Virtual Profile and update the recipe.

ENGINEER (CREATE RECIPES)

"Engineer (Create Recipes)" is the next privilege level and allows the user to perform all of the functions that are necessary to setting up and maintaining the Prophet Thermal Manager, SlimKIC, SlimKIC-II, or SideKIC Thermal Profilers, or the Quick-KIC Thermal Recorder. At this level, all of the functions are available that are needed to perform all of the examples in our "KIC Software Tutorial".

ADVANCED ENGR.

"Advanced Engr." is the next privilege level and it allows all of the functionality of the previous levels plus it adds a plethora of specialized tools for unique applications.

ADMINISTRATOR

The "Administrator" level is used to enable password protection and define user names and passwords. This level is not needed unless password protection will be used. The default administrator user name is "ADMIN", the default password is "KOB".

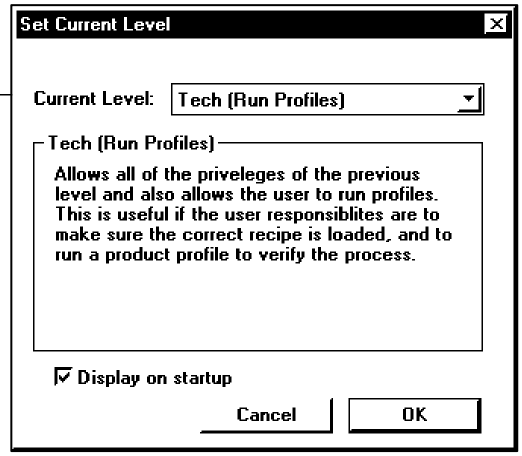
If your Privilege Level assignment is anything higher than View Only, you may, at your discretion, choose to select a lower Privilege Level. This will allow you to minimize tools and options that you simply don't want displayed at the time, in much the same fashion as the Function Levels do.

To select a lower Privilege Level, select **Current Level** from the Setup list menu, or use ALT+S+C. The **Set Current Level** dialog box will appear.

Select a Privilege Level from the **Current Level** list menu, then click OK.

Note: Use this same procedure to return to your original Privilege Level.

To prevent others from accessing you Privilege Level, select **Logoff** from the File list menu (ALT+F+L) to bring the KIC software down to the View Only mode.

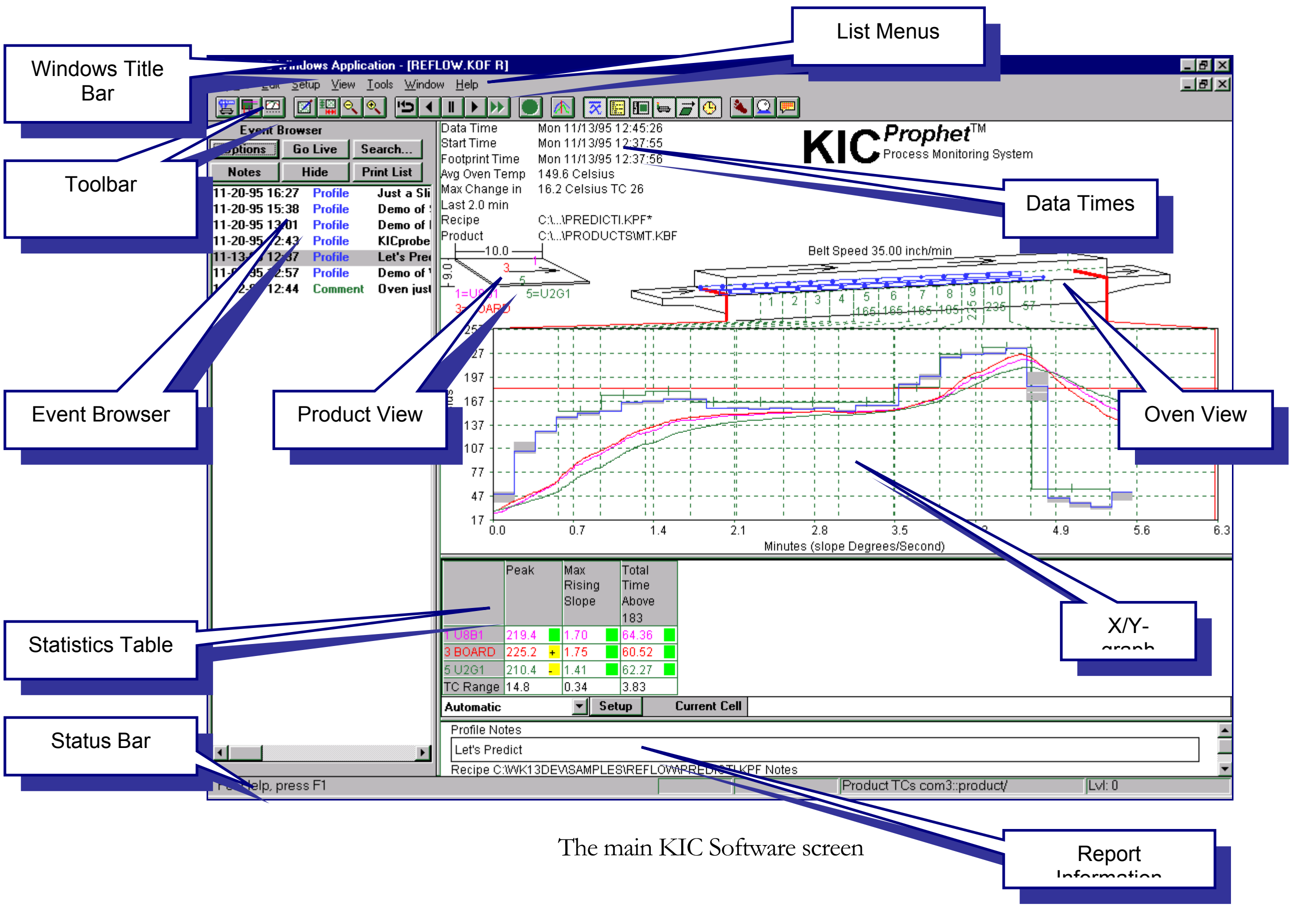

Set Current Level
Current Level:
Tech (Run Profiles)
Tech (Run Profiles)
Allows all of the priveleges of the previous level and also allows the user to run profiles. This is useful if the user responsiblites are to make sure the correct recipe is loaded, and to run a product profile to verify the process.
Display on startup
Cancel
OK

View

OVERVIEW

The view list menu contains items that can be viewed or hidden from the main KIC software screen. There will be times when viewing certain items may be inappropriate for achieve the task at hand and tend to clutter the screen. Using the view list menu, items can be removed or placed on the main screen at your discretion.

To access this menu, choose **View** from the list menu bar or press ALT+V.



The main KIC Software screen

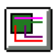
Toolbar

The Toolbar provides rapid access to some of the most used features of the KIC software.

The Toolbar

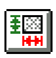
Depending on the User Level selected, the following items may appear on the Toolbar:

 - Setup Oven

 - Setup Product

 - Setup Recipe

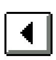
 - Redraw

 - Auto-scale

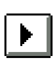
 - Zoom Out

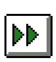
 - Zoom In

 - Replay Current Profile

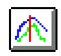
 - Start/Accelerate History Backward

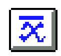
 - Freeze Display of History

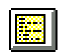
 - Start/Accelerate History Forward

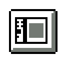
 - Go Back to Live Data Mode

 - Start Profile F2

 - Pointer

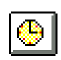
 - View Statistics

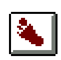
 - View Report Information

 - View Event Browser

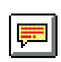
 - View Oven

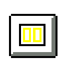
 - View Product

 - View Data Times

 - Reset Footprint

 - Prediction

 - Screen Comments

 - Reset Board Counter

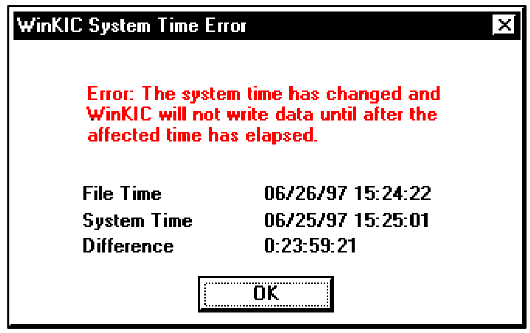
To display the Toolbar, choose **Toolbar** from the view list menu or press ALT+V+T. If the Toolbar is already active (displayed) a check-mark will appear to the left of this item.

By default, the Toolbar is displayed.

Data Times

The Data Times are located above and left of the X/Y-graph and contain key information about the information currently displayed on the graph.

- **Live Time [Date] [Time]** – When the KIC software is successfully receiving temperature data at the frequencies specified in the Setup/Oven/More/Sampling Rates dialog box, this will appear on the top line of the Data Times as green text.
- **Live (Data Late) [Date] [Time]** – When the KIC software has not successfully received temperature over a period of two times the frequency specified in the Setup/Oven/More/Sampling Rates dialog box, this will appear on the top line of the Data Times in red text.
- **Waiting for Clock to Catch-up [Date] [Time]** – If the KIC software detects a discrepancy between the current date & time of the computer clock and the date & time written to the last history file (i.e., the history file reflects a later date than reported by the computer) this will appear on the top line of the Data Times.



Note: If this condition exists when the KIC software is started, a System Error dialog box will appear explaining the problem. You should shut the KIC software down and correct the discrepancy prior to any further use of the software.

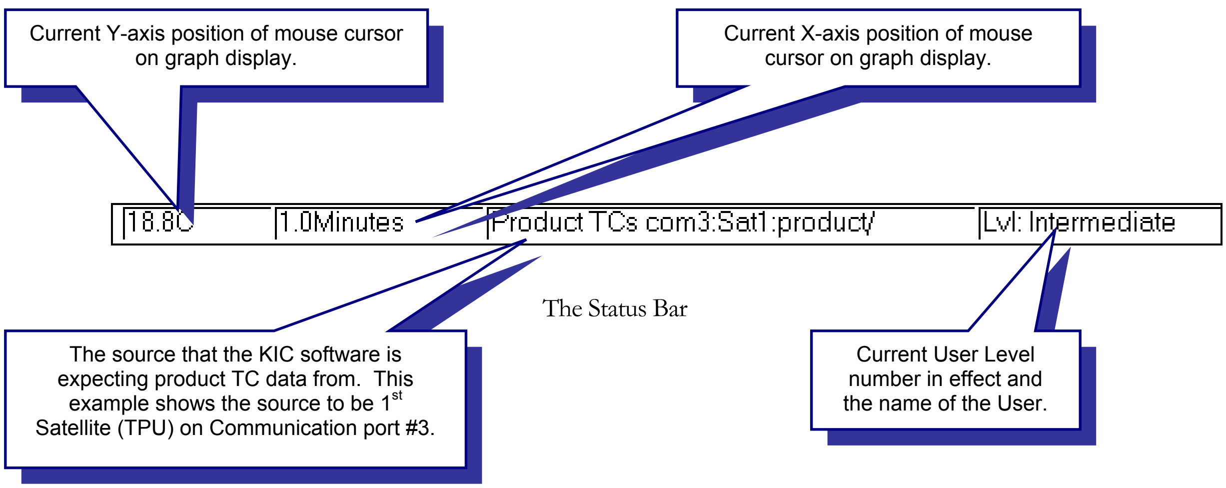
- **Profiling Live [Date] [Time]** – When actively running a profile, this will appear as green text and will constantly update as the profile progresses. When the profile is finished, this will later be annotated as the Data Time (see below) and indicate the end of the data collection period for that profiling event.
- **Profiling Data [Date] [Time]** or **Data Time [Date] [Time]** – These reflect the end of the data collection period of the event displayed on the graph. When actively running a profile, but currently viewing an event from history, the text will read “Profiling Data”. When not running a profile, but currently viewing an event from history, the text will read "Data Time”.
- **Start Time [Date] [Time]** – This is the data collection start time for the profile currently being view on the graph.
- **Footprint Time [Date] [Time]** – This is used to determine when the length of the Footprint data accumulation period, and is the date and time since the Footprint data was last reset.
- **Avg Oven Temp [Degrees]** – This is the average of all the KICprobe thermocouple temperatures with their respective KICprobe TC Weights considered.
- **Max Change in Last x Minutes [Degrees] [TC# Identification]** – This is the KICprobe Stability value and indicates the greatest single shift of all the KICprobe thermocouple temperatures over the user define time reference.
- **Recipe [directory path/filename]** – This is the directory path and file name of the Recipe used in history, or currently being used live, and indicates the source of the Recipe file.

- **Product [directory path/filename]** – This is the directory path and file name of the Product used in history, or currently being used live, and indicates the source of the Product file.

Status Bar

The Status Bar, located at the very bottom of the KIC software screen, provides information about the following:

- Mouse cursor location on the graph
- Assigned source of product thermocouple data
- User name and User Level in effect



The Status Bar

To display the Status Bar, choose **Status Bar** from the view list menu or press ALT+V+S. If the Status Bar is already active (displayed) a check-mark will appear to the left of this item.

By default, the Status Bar is displayed.

TC Buttons

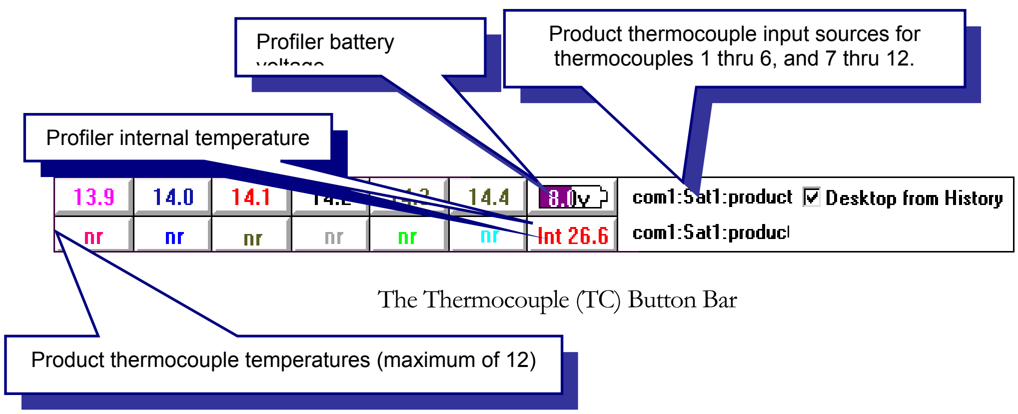
The option will display or hide the Thermocouple (TC) Button Bar.

To select or deselect the TC Button Bar display, choose **TC Buttons** from the view list menu or press ALT+V+B. If the TC Button Bar is already active (displayed) a check-mark will appear to the left of this item.

MAP OF THE TC BUTTON BAR

The TC Button will display the following information:

- Up to 12 product thermocouples
- A profiler battery voltage indicator
- An indication of the profiler's internal temperature
- The communication input source of the product thermocouple data
- A Desktop from History checkbox



The Thermocouple (TC) Button Bar

THE THERMOCOUPLE BUTTONS

These buttons indicate the temperature of each product thermocouple in use and reflect whichever temperature scale has been selected by the user for the graph's Y-axis (Setup/Recipe/Axis Scales).

These buttons have eight possible states:

- 29.1 - Indicates a TC temperature reading.
- hist - Indicates that the current viewing is historical data (HISTORY).
- off - Indicates that the TC is setup, but the is no input.
- opn - Indicates that the TC is setup, but is not installed (OPEN).
- chk - Indicates a checksum error in the TC reading.
- nr - Indicates that the TC was previously used, but is no longer found (NO READING).

- 

 - Indicates that the TC is reading a temperature that is beyond (over-range) the MAX TEMP range setting for the SlimKIC.
-  - Indicates that the TC is setup for use, but has been manually deselected for viewing on the X/Y-graph.

TPU Receiver	Thermocouple Enabled		Thermocouple Disabled	
	Selected	Deselected	Selected	Deselected
1) Checking for TC Hardware	CHK[1]	CHK[1]	CHK[1]	CHK[1]
2) TC Present	OPN	OFF	OPN	OFF
3) TC Not Present	Temp Reading	OFF	OPN	OFF
A) Over Range	Temp Locks High	OFF	OPN	OFF
4) Previously Found	OFF	OFF	OFF	OFF
5) Bad Voltage	NA	NA	NA	NA

[1] May indicate a checksum error if a SlimKIC is setup for 2400 baud and trying is to communicate through a TPU, which is expecting 1200 baud.

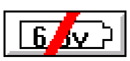
Slim KIC Direct Connect	Thermocouple Enabled		Thermocouple Disabled	
	Selected	Deselected	Selected	Deselected
1) Checking for TC	CHK[1]	CHK[1]	CHK[1]	CHK[1]
2) TC Present	Temp Reading	NR	OPN	NR
3) TC Not Present	OPN	NR	OPN	NR
A) Over Range	OVR	NR	OPN	NR
4) Previously Found	NR	NR	NR	NR
5) Bad Battery Voltage	NA	NA	NA	NA

[1] Checksum Error

Thermocouple Button quick-reference table.

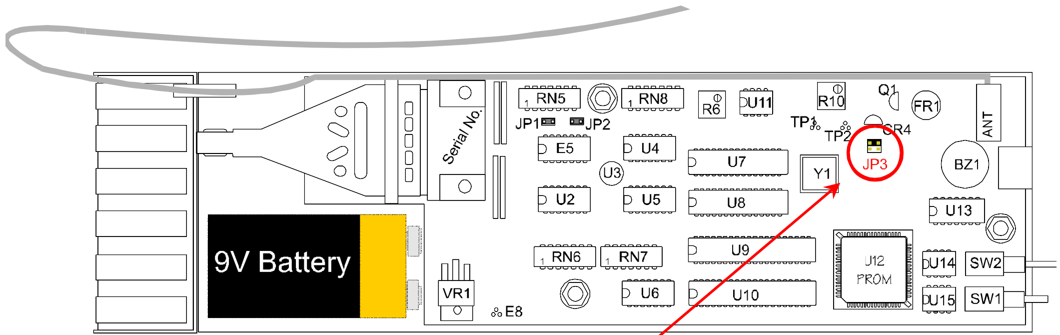
BATTERY VOLTAGE INDICATOR

- 

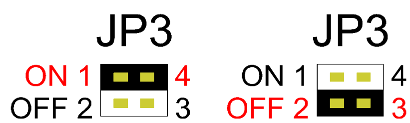
 - Indicates the normal battery voltage.
-  - Indicates a battery voltage that is at or below 6.9 volts dc.

Note: The battery must be replaced when the voltage drops below 7 volts dc.

The battery life of the SlimKIC can be extended somewhat by disabling the RF circuit when utilizing it for datalogging purposes. To do this, move the jumper on JP3 from the 1-4 (ON) position to the 2-3 (OFF) position.



The location of the JP3 inside the SlimKIC



Disabling the RF circuit on the SlimKIC

This procedure is the only correct way of disabling the RF circuit. **Never** remove the antenna from it's base while operating the SlimKIC. Doing so **does not** disable the RF circuit and may void the warranty of the SlimKIC.

Note: Remember to replace this jumper block back onto the ON position when using the SlimKIC in the RF mode is desired.

INTERNAL TEMPERATURE BUTTON

The internal temperature of the SlimKIC and SideKIC can be independently monitored along with the profile to prevent damage caused by excessive heat.

The Internal Temperature Button will automatically appear on the TC Button bar whenever is SlimKIC or SideKIC is setup through the Hardware Input Monitor and the profiler is ON and reporting temperature data.

As a means of maintaining a historical record of the internal temperature exposure sensed by the SlimKIC or SideKIC, this information can additionally be plotted on the X/Y-graph as part of the regular product profile.

To do this, select the Internal thermocouple off the TC list (TC #15) in the Setup/Product dialog box and Save the product setup. Each time a profile is run thereafter, the internal temperature of the profile will appear on the X/Y-graph along with the product profile.

To exclude the Internal temperature thermocouple when analyzing the Statistics Table, simply click on the Internal TC Button to disable it.

Temperature Limitations of the SlimKIC and SideKIC

Normally, the SlimKIC or SideKIC internal temperature should never exceed 100ºC.

Exposing the SlimKIC or SideKIC to an Internal temperature in excess of 100ºC will void the warranty of the SlimKIC.

While running a profile, if the SlimKIC internal temperature reaches 80ºC, the KIC software will issue a warning in the form of a screen dialog box. Depending on where in the process this happens, it may be advisable to remove the SlimKIC as soon as possible. At the very minimum, this situation should be closely monitored to ensure that the specified maximum temperature is not exceed.

If the maximum allowable internal temperature is exceeded, this too will appear on the screen in the form of a dialog box. This SlimKIC or SideKIC should be returned to the factory for diagnostics and/or repairs at your earliest possible convenience. Although the SlimKIC may still appear to be working correctly, at times it may only work intermittently.

The SlimKIC will maintain a running record of the highest temperature that it has been exposed to during it's lifetime. This value can only be reset at the factory.

Zoom Out

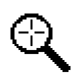
The X/Y-graph, by default, will fit all data currently selected for display within it's viewable boundaries. The Zoom Out tool allows the user to sequentially "undo" a series of "Zoom Ins", essentially backing-up from previous zooms.

To zoom out, choose **Zoom Out** from the **View** list menu, press ALT+V+M, or select the  button from the Tool Bar.

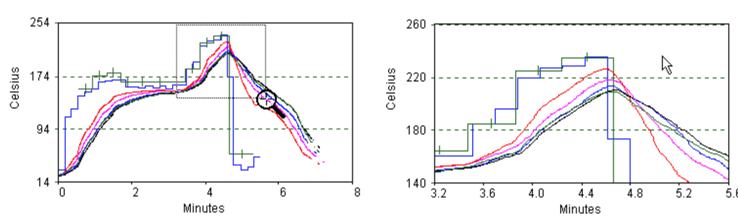
Zoom In

The X/Y-graph, by default, will fit all data currently selected for display within it's viewable boundaries. The Zoom In tool allows the user to decrease the scale of the X and Y axis by outlining a section of the graph. To use this feature:

- Choose **Zoom Out** from the **View** list menu, press ALT+V+M, or select the  button from the Tool Bar. The mouse cursor will change to a magnifying glass when placed on top of the X/Y-graph.

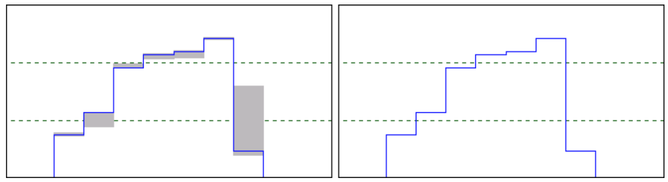


- Place the magnifying glass over the top-left corner of the area of interest on the X/Y-graph, then press and hold the left mouse button.
- Drag the mouse to the bottom-right corner of the area of interest. A box will outline the area that will fit the X/Y-graph.
- Release the mouse button. The X/Y-graph will automatically resize to the outlined area.



Reset Footprint

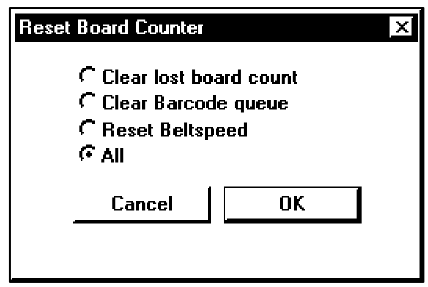
The footprint of the KICprobe shows the variance of the temperatures for each of the thermocouples over time. Resetting the Footprint will remove the outlines of these variances and immediately begin building new ones.



To reset the KICprobe Footprint, choose **Reset Footprint** from the **View** list menu, press ALT+V+R, or select the  button from the Tool Bar.

Reset Board Count

This feature is only used when a Board Sensor system has been implemented. To reset the KICprobe Footprint, choose **Reset Board Count** from the **View** list menu or select the  button from the Tool Bar. The **Reset Board Counter** dialog box will appear.



To Use this Option:

- **Clear Lost Board Count** – Select this option to clear any lost boards detected.
- **Clear Barcode Queue** – Clear all Barcodes currently in the queue.
- **Reset Beltspeed** – Resets the calculated beltspeed to the target beltspeed found in the Setup Recipe dialog box.
- **All** – Clears lost board counter, barcode queue, and resets the beltspeed.

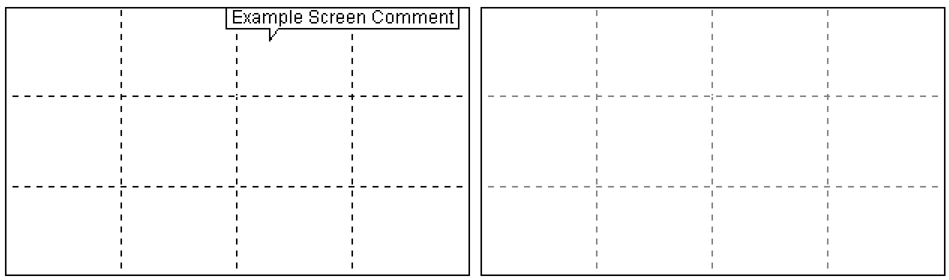
Screen Comments

Screen Comments provide a means of attaching important notes or comments directly on top of a displayed profile. These Screen Comments, when created, are directly associated only with that particular profile or event.

Screen Comments can also associated with just time (i.e., not placing a box of text on the screen). In this case, the comment will only appear on the Event Browser, but still be associated with the event that was being displayed on the screen (live or history) when they were created.

There will be times when you might have a need to temporarily remove the Screen Comment(s) from the X/Y-graph display to facilitate viewing of other critical information.

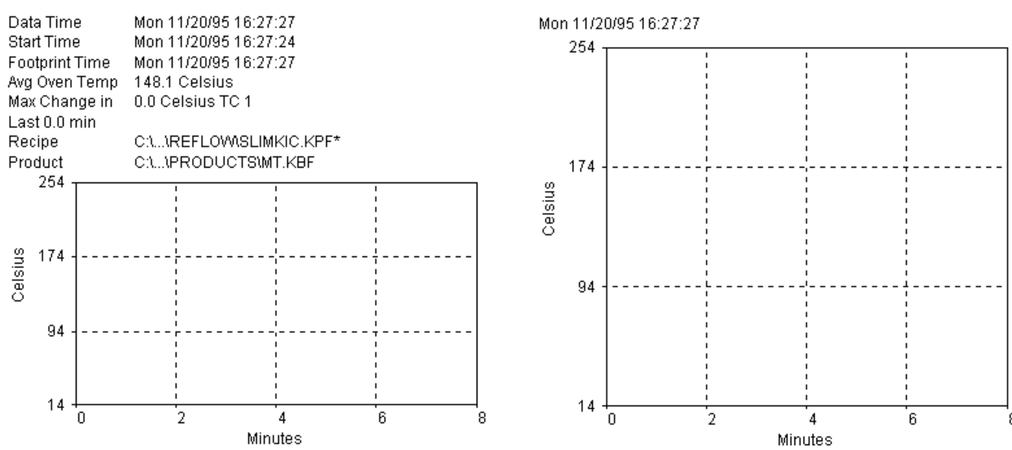
To hide or view the screen comments, choose **Comments** from the **View** list menu or press ALT+V+C.



Data Times

The Data Times are displayed above and left of the X/Y-graph. The information found in this area associate the event being displayed on the graph with date, time, product used (in use), recipe used (in use), as well as average and stability temperatures of the oven.

To hide or view the Data Times, choose **Data Times** from the **View** list menu, press ALT+V+D, or click on the  icon from the toolbar.

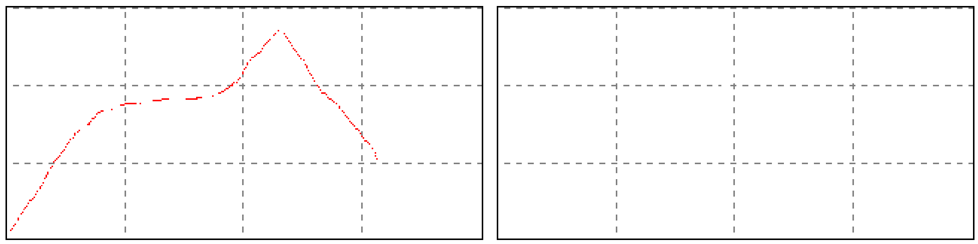


Guide Profile

Whenever you are finished using the Profile Prediction or Auto-Predict (optional) tool and have decide to use the changes made, a Guide Profile will appear on the graph.

This Guide Profile is literally the predicted profile for thermocouple #1, and is used as a visual guide for making subjective comparisons of a subsequent profile based on their patterns.

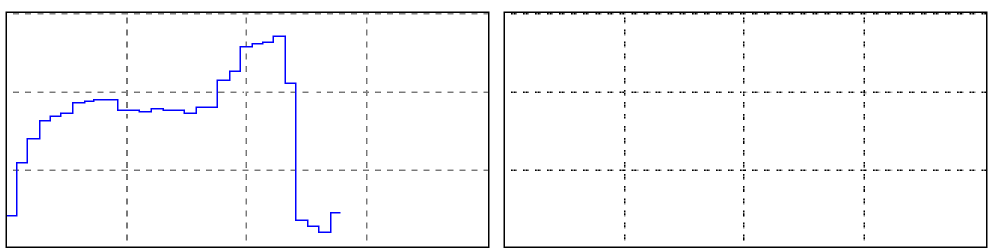
To hide or view the Guide Profile, choose **Guide Profile** from the **View** list menu, or press ALT+V+G.



KICprobes

The KICprobe temperatures are displayed on the graph as a stair-step pattern, typically blue by default, and represents the real temperatures of the oven close to where the product is physically located.

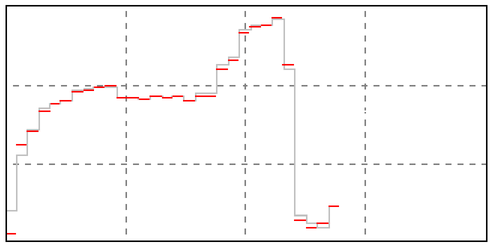
To hide or view the KICprobes, choose **KICprobes** from the **View** list menu, or press ALT+V+K.

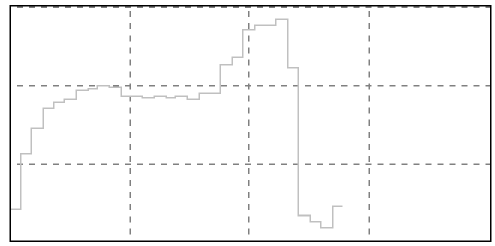


KICprobe Target (Virtual Profile)

Whenever a Virtual Profile is in use, “target” temperatures are posted on the graph that indicate the baselines for all measure deviations of the KICprobe temperatures.

To hide or view the KICprobe Target temperature markers, choose **KICprobe Target (Virtual Profile)** from the **View** list menu, or press ALT+V+V.





Product

To help familiarize you as to the products orientation and the thermocouple positions, a diagram of the product with the thermocouple positions can be displayed above the X/Y-graph.

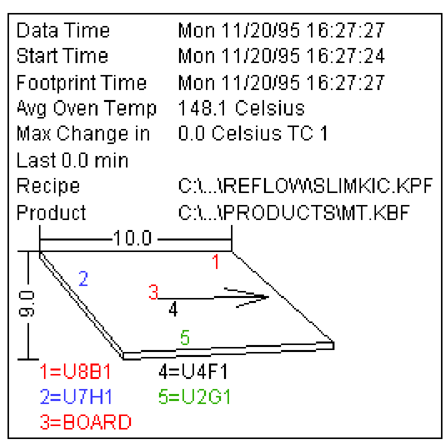
This diagram has three different views:

- Board diagram with thermocouple positions
- Board diagram with thermocouple positions and placement descriptions
- Thermocouple placement descriptions

To switch between the different views, simply click on the area of the board diagram.

Notes: Depending on what’s currently displayed on the screen, there may not be enough screen space to properly display the board with the placement descriptions. In this case, only the board diagram or the placement descriptions may be viewable.

To hide or view the Product diagram, choose **Product** from the **View** list menu, press ALT+V+V, or click on the  icon from the Toolbar.



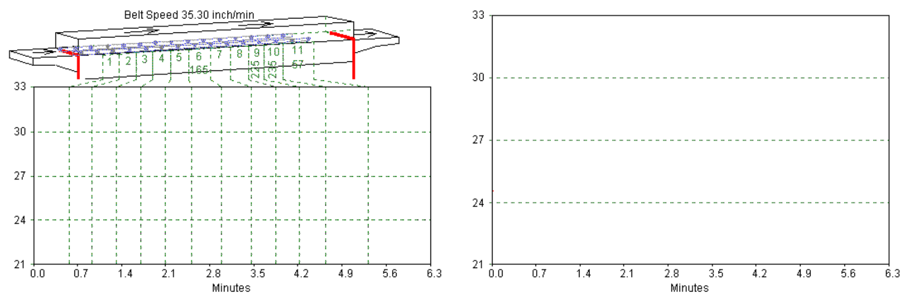
Oven

To help familiarize you as to the oven's setup, a diagram of the oven with the can be displayed above the X/Y-graph. This diagram depicts the actual distances between the oven entrance, zones, and exit.

If KICprobes are installed and setup in the KIC software, they will also be displayed inside the oven diagram to show a true representation of their orientation within the oven. Each of the oven's zones are superimposed onto the X/Y-graph.

Displaying the oven can help you quickly locate the exact locations of trouble areas within the oven.

To hide or view the Oven diagram, choose **Oven** from the **View** list menu, press ALT+V+O, or click on the  icon from the Toolbar.

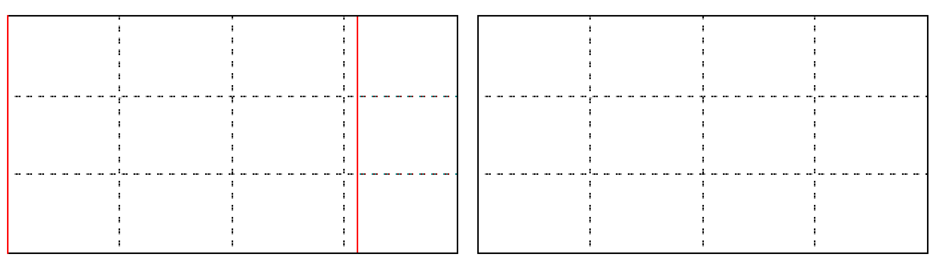


Oven Start/End Markers

The Oven Start/End Markers are used as reference markers superimposed on the graph that represent the profile start and end positions.

Note: The profile start and end positions are, in most cases, the actual oven entrance and exit.

To hide or view the Oven Start/End Markers, choose **Oven Start/End Markers** from the **View** list menu or press ALT+V+E.

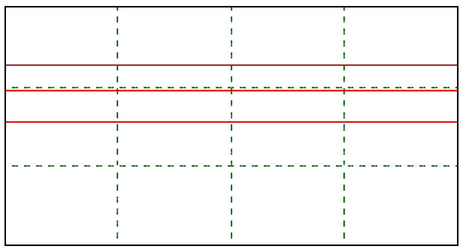
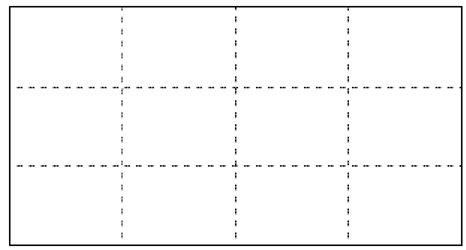


Reference Temperatures

Reference Temperatures are those assigned in the Setup/Recipe/Time Above dialog box. Whenever the Statistics Table is displayed, the Reference Temperatures are displayed as horizontal lines on the graph emanating from the assigned temperature value on the graph's y-axis.

However, you can also force the display of these Reference Temperatures even when the Statistics Table is not being used.

To hide or view the Reference Temperatures, choose **Reference Temperatures** from the **View** list menu or press ALT+V+U.

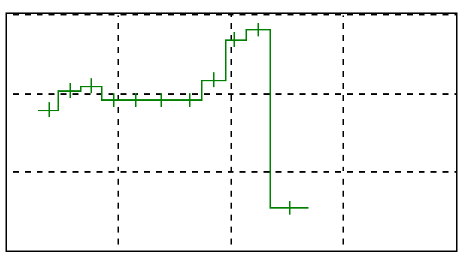
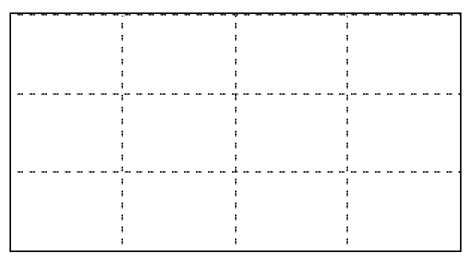



Setpoints

The Setpoints are the temperature for each of the oven's zones as assigned in the Setup/Recipe/Setpoints dialog box. These Setpoints can be graphically superimposed directly onto the X/Y-graph for reference purposes.

Each Setpoint is oriented to reflect it's position within the oven along the x-axis, and the temperature setting along the y-axis. Small verticals within each displayed Setpoint represent the exact location of the oven's closed-loop control thermocouple, as described in the Set/Oven dialog box.

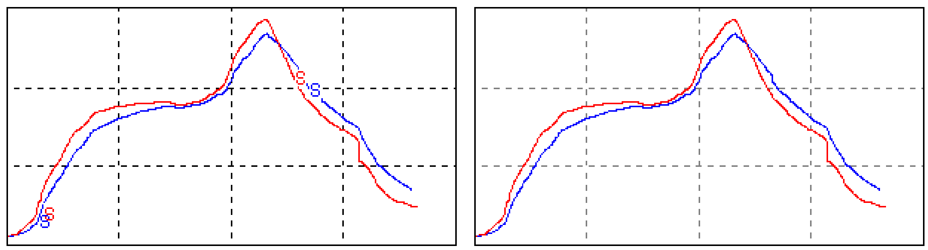
To hide or view the Setpoints, choose **Setpoints** from the **View** list menu or press ALT+V+I.

Slope Markers

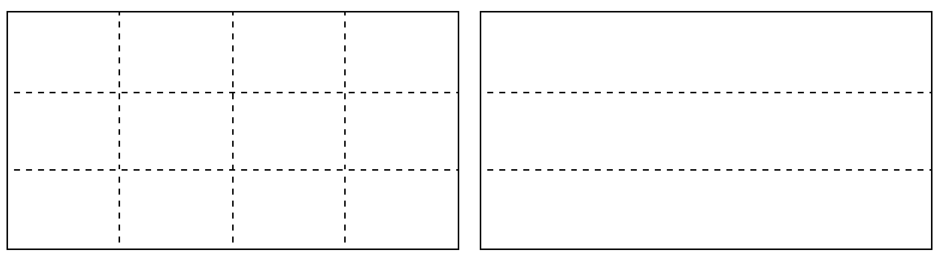
The Slope Markers are used as a means to quickly display the locations with the greatest rising and fallings slopes for each product thermocouple. These are displayed on the graph as S's that are colored coded to correspond to the thermocouple they represent.

To hide or view the Slope Markers, choose **Slope Markers** from the **View** list menu or press ALT+V+L.



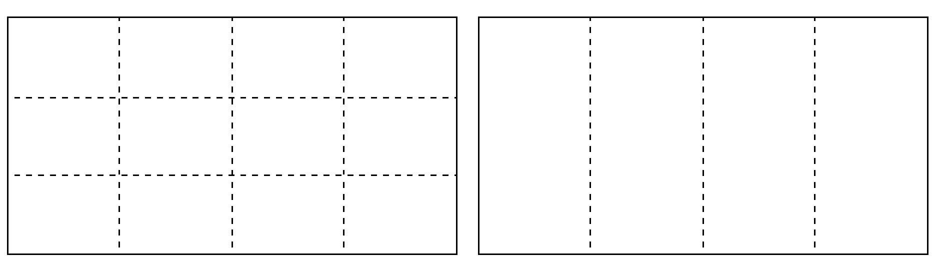
X Grid

To hide or view the X Grid, choose **X Grid** from the **View** list menu or press ALT+V+X.



Y-Grid

To hide or view the Y Grid, choose **Y Grid** from the **View** list menu or press ALT+V+Y.

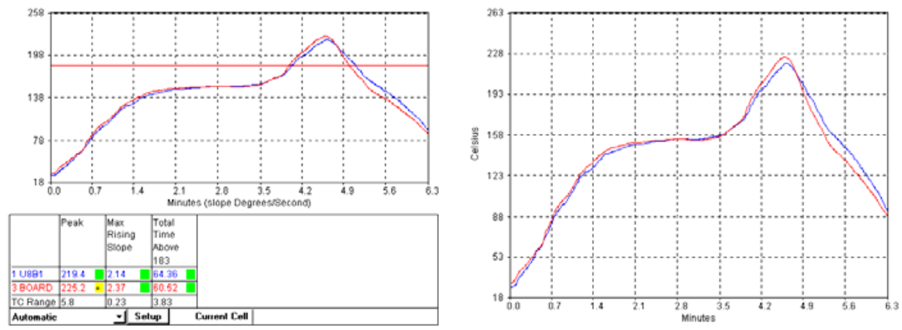


Statistics

The Statistics table will provide a means of viewing all the critical and user defined statistics for the product profile and is displayed below the X/Y-graph.

To hide or view the Statistics, choose **Statistics** from the **View** list menu or press ALT+V+A.

Note: The Statistic Table may alternatively be displayed or hidden by moving the mouse pointer to the lower most edge of the KIC software display, then clicking and dragging the edge up or down in much the same fashion as a sliding window.

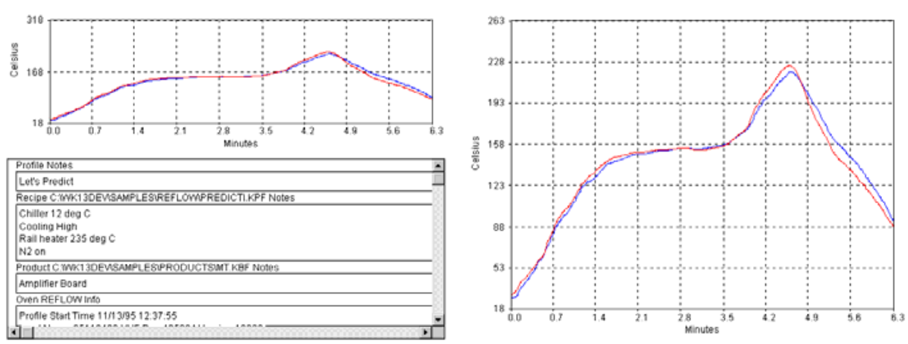


Report Information

The Report Information contains date/time information, product and notes about the event displayed on the X/Y-graph. The Report Information is displayed below the graph.

To hide or view the Report Information, choose **Report Information** from the **View** list menu or press ALT+V+F.

Note: The Report Information may alternatively be displayed or hidden by moving the mouse pointer to the lower most edge of the KIC software display, then clicking and dragging the edge up or down in much the same fashion as a sliding window.

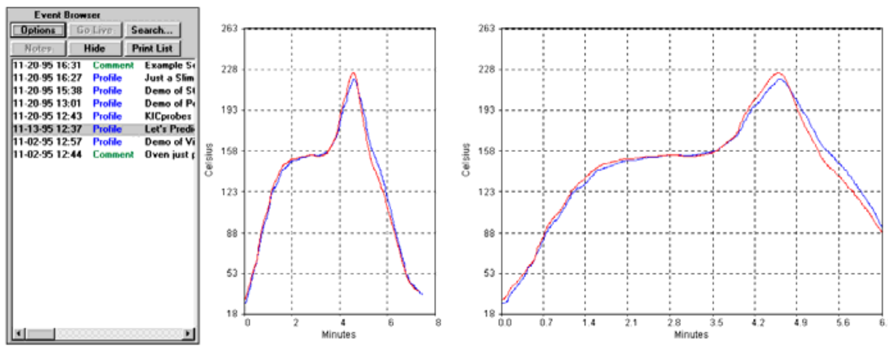


Event Browser

The Event Browser provides an easy method of accessing and selecting past events to quickly display them on the X/Y-graph.

To hide or view the Event Browser, choose **Event Browser** from the **View** list menu or press ALT+V+W.

Note: The Event Browser may alternatively be displayed or hidden by moving the mouse pointer to the left most edge of the KIC software display, then clicking and dragging the edge left or right in much the same fashion as a sliding window.



Tools

OVERVIEW

This list menu contains tools for accomplishing tasks such as maintaining and accessing the data in the Event Browser, predicting profiles, and placing Pointers on the X/y-graph.

To access this menu, choose **Tools** from the list menu bar or press ALT+T.

Autoscale

Autoscale will automatically resize the X and Y scales of the graph to accommodate all data currently selected for viewing.

To access this feature, select it from the Tools list menu, press ALT+T+A, or select the  icon from the toolbar.

Redraw

When making rapid changes to the items being viewed on the KIC software, it's possible that remnants from removed items remain on the X/Y-graph. To remove these remnants, use the Redraw feature.

To access this feature, select it from the Tools list menu, press ALT+T+R, or select the  icon from the toolbar.

Prediction

Prediction is used to perform "what if" analysis of a profile. By changing the oven parameters it's possible to analyze the reaction of the product profile without the need to make physical changes to the oven settings.

To access this feature, select it from the Tools list menu, press ALT+T+P, or select the  icon from the toolbar.

Pointer

The Pointers are a unique tool used to examine profile data about the vertical axis, rather than the horizontal axis, as is the case with the Statistics Table. Up to 6 Pointers can be displayed at once and the corresponding data is represented inside the Statistics Table.

To access this feature, select it from the Tools list menu, press ALT+T+T, or select the  icon from the toolbar.

Log to Text File

This feature provides the ability to collect user selected data from the history files by clicking on the event(s) of interest directly from within the Event Browser. It has both

an ON and OFF state, as indicated by a check mark placed next to it on the Tools list menu when ON.

To access this feature, select it from the Tools list menu or press ALT+T+L.

Goto Time/File

This feature permits rapid movement between events within the Event Browser. Either Date/Time of the history file or the actual history file name can be selected.

To access this feature, select it from the Tools list menu or press ALT+T+G.

Rebuild Event List

In the unlikely event that the Event Browser somehow becomes corrupted, or history files are archived off the hard drive, the Event Browser will need to be “rebuilt”. Rebuilding the Event Browser ensures that the information within the history files are correctly linked.

To access this feature, select it from the Tools list menu or press ALT+T+

Window

OVERVIEW

The Windows list menus contain conventional items found in most Windows programs for arranging the application’s screen display. One notable exception to this is the **Log** item, which is actually used to display a window of the KIC software communication events.

To access this menu, choose **Window** from the list menu bar or press ALT+W.

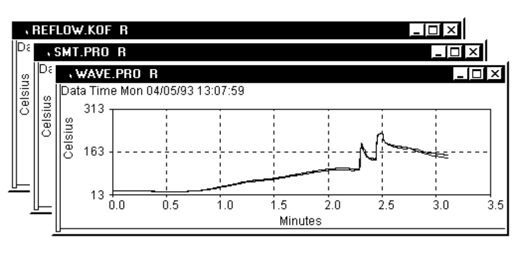
New Window

Selecting this option will create another file window identical to the currently active file. It is a standard Windows 3.1 convention but is rarely ever support by many Windows applications. You can use this feature to create a second Window of the one currently in the foreground, but any changes to either Window will reflect on the other.

To access this feature, select it from the Window list menu or press ALT+W+N.

Cascade

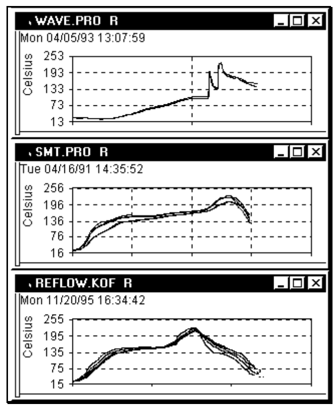
Select this option to cause all open files to arrange on the desktop in a cascaded order.



To access this feature, select it from the Window list menu or press ALT+W+C.

Tile Horizontal

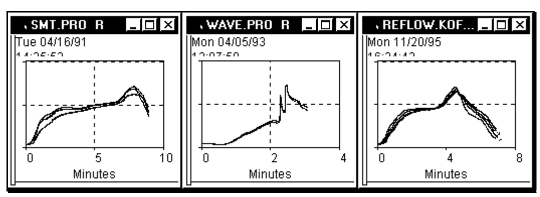
Select this option to cause all open files to arrange on the desktop in a horizontally tiled order.



To access this feature, select it from the Window list menu or press ALT+W+T.

Tile Vertical

Select this option to cause all open files to arrange on the desktop in a vertically tiled order.



To access this feature, select it from the Window list menu or press ALT+W+V.

Arrange Icons

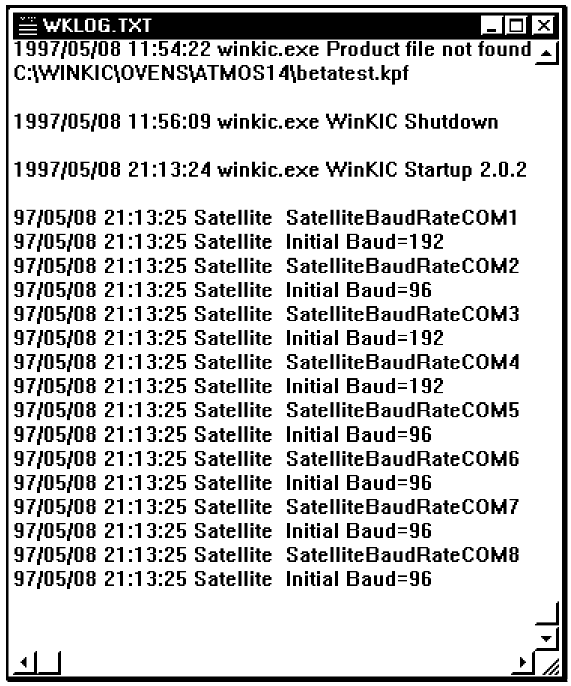
This feature will quickly organize all minimized files to the bottom left area of the screen.

To access this feature, select it from the Window list menu or press ALT+W+A.

Log

This is a special Window used for tracking communication calls by the KIC software and is used to augment other hardware diagnostics when troubleshooting communication problems between the KIC software and the hardware. The name of the file is WKLOG.TXT and cannot be changed.

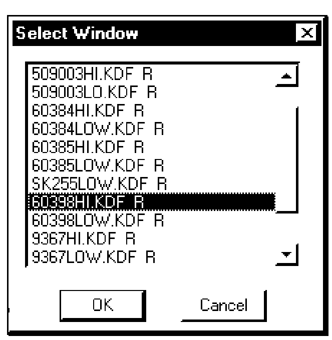
To open this file, select it from the Window list menu or press ALT+W+L.



First 9 Opened Files

These options are actually the filenames of the currently active files and provide a means for quickly moving around the different files when not organized on the screen using the tile or cascade options by bringing the file to the foreground and placing the rest in the background.

To access the first 9 files currently open, select it from the Window list menu or press ALT+W+1, 2, 3,…9.

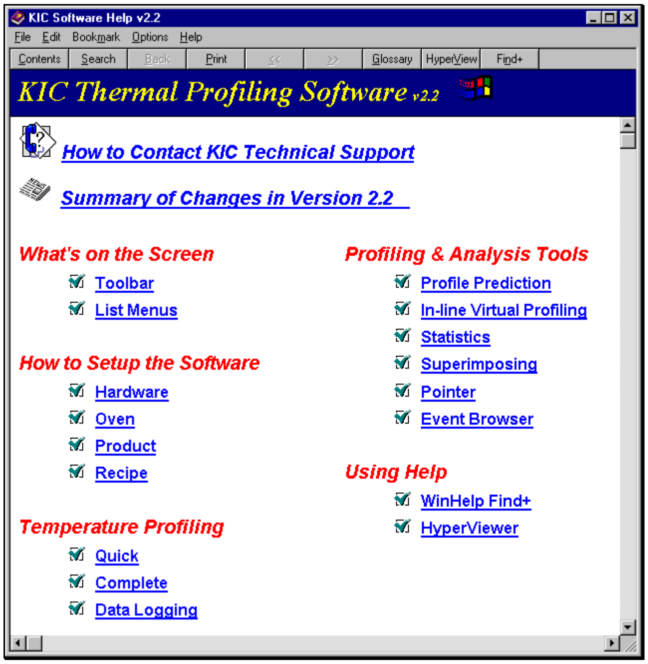


Help

OVERVIEW

The Help list menu contains items generally found in standard Windows applications. This is where access to the Help file and information about the KIC software and the computer hardware setup is found.

To access this menu, choose **Help** from the list menu bar or press ALT+H.



Index & Using Help

OVERVIEW

The KIC software Help screen can quickly provide answers about the software features as well as provide guidance about using the system. Tools, both standard Windows as well as enhanced, that help you to find the right information expediently are provided and easy to use.

The Help screen provides a toolbar of 9 buttons to help you navigate the Help file contents:

- Contents (ALT+C) - When selected, will place you in the first Help file topic (contents screen). This method utilizes the normal procedures of pointing and clicking on hot-links. Hot-links are normally colored green and are underlined. This method is preferable because the hot-links in each screen are logical progressions between the information provided in the screen.
- Search (ALT+S) - When selected, will cause the **Help Topics** dialog box to appear. This dialog box will appear different depending on whether you are running Windows 3.1 or 3.11, and Windows 95/NT.

  - ✓ Windows 3.1 and 3.11 - Input the keyword(s) that you wish to locate in the Help file topic headings. Only the Help file topic headings will be searched. This is NOT a complete text search of the entire Help file contents.
  - ✓ Windows 95/NT
    - ∗ Index Tab Card - Input the keyword(s) that you wish to locate in the Help file topic headings. Only the Help file topic headings will be searched. This is NOT a complete text search of the entire Help file contents.
    - ∗ Find Tab Card - Input the keyword that you wish to locate in all the text of the Help file. Only one keyword is allowed. Although the entire contents of the Help file are searched, only the Help topics containing instances of the keyword are presented.
- Glossary (ALT+G) - The glossary is an alphabetical index of the Help file topics. When selected, a separate Window showing the Glossary will appear. You can either scroll this the Help topics listing or click on the letter button corresponding to the first letter of the topic of interest.
- HyperViewer (ALT+V) - If you use the Windows File Manager, you will find the HyperViewer instantly familiar—the HyperViewer is to a Help system what File Manager is to a hard disk. Instead of displaying the files and directories on a hard disk, the HyperViewer displays the topics and hotspots in a Help system. The HyperViewer includes the following features:
  - ✓ The HyperViewer is built for you automatically and is a true representation of the hypertext links in the Help system.
  - ✓ The HyperViewer is displayed as books and pages. Books are topics that contain hotspot links to more topics. Pages are topics that do not contain hotspots links to other topics.
  - ✓ Jump topics and popup topics are represented by different icons so you can easily tell the difference just by looking at the HyperViewer.
  - ✓ You can print all topics or multiple topics from the HyperViewer.
  - ✓ You can size the HyperViewer window and change the font.
  - ✓ You can select Always on Top so that the HyperViewer window always displays.
- Find+ (ALT+N) - If you want to find help on a particular topic in a Windows Help System, the Search button is usually the option you use. It lets you search through a list of keywords or phrases defined by the Help file author, and from there jump to selected topics. This has its drawbacks. If the Help file author didn't supply a keyword for the information you're looking for, you have to guess at synonyms for that keyword. You may never find the information, even though it is in the Help file.

  Find+ lets you perform a full-text search on the Help system—you enter a word or phrase and the Find+ searches all of the Help text, not just the titles, keywords, or context strings. This makes it easy to find the information you are looking for.
- Back (ALT+B) - This button will return you to the last topic page viewed.
- >> - Sequentially scrolls one page (topic) forward in the Help file.
- << - Sequentially scrolls one page (topic) backward in the Help file.
- Print (ALT+P) - Allows the current page (topic) to be sent to the printer.

Other features of the KIC software Help file:

- Annotate (ALT+E+A) - This feature is found under the Edit list menu of the Help application and provides the ability of amending to the Help file any other notes

the user wishes to add. The annotation appears on the topic screen as a paper-clip icon and is a hotspot that can be selected to view the note.

The Annotations placed on the Help topics will remain there until specifically removed.

Note: Only one annotation to a help topic is allowed, but you can amend text to an existing annotation. You cannot insert annotations to the Glossary Window.

- Bookmark (ALT+M+D) - This feature provides the ability of creating a custom listing of the mostly frequently accessed topics within the Help file. When creating a Bookmark, the default name appearing on the list will be the topic heading, however, the user may reassign their own descriptive text.

  The Bookmarks placed into the list will remain there until specifically removed.
- Display History Window (ALT+O+D) - This feature is found under Option list menu and will display a dialog box showing a list of the Help topics browsed during the session. This listing is cleared once the Help file is closed.

USING WINHELP FIND+ TO PERFORM A FULL-TEXT SEARCH

ABOUT WINHELP FIND+

WinHelp Find+ allows you to search for a word or phrase through the entire text of a Help file. It lists topics in which the word or phrase occurs and shows how many times it occurs within each topic. WinHelp Find+ also allows you to jump to the topic or print the topic.

HOW IS FIND+ DIFFERENT FROM WINHELP SEARCH?

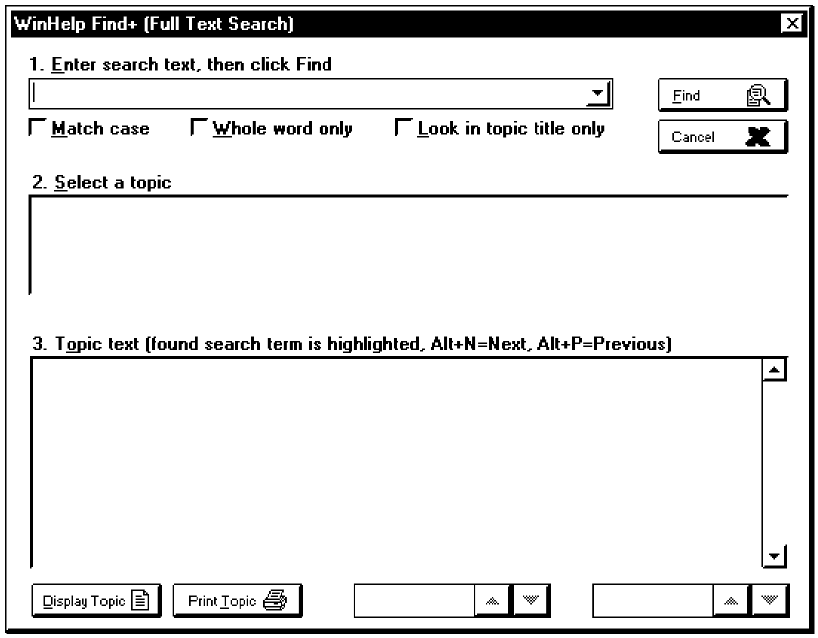
If you want to find help on a particular topic in a Windows Help System, the Search button is usually the option you use. It lets you search through a list of keywords or phrases defined by the Help file author, and from there jump to selected topics. This has its drawbacks. If the Help file author didn't supply a keyword for the information you're looking for, you have to guess at synonyms for that keyword. You may never find the information, even though it is in the Help file.

WinHelp Find+ lets you perform a full-text search on the Help system—you enter a word or phrase and the Find+ searches all of the Help text, not just the titles, keywords, or context strings. This makes it easy to find the information you are looking for.

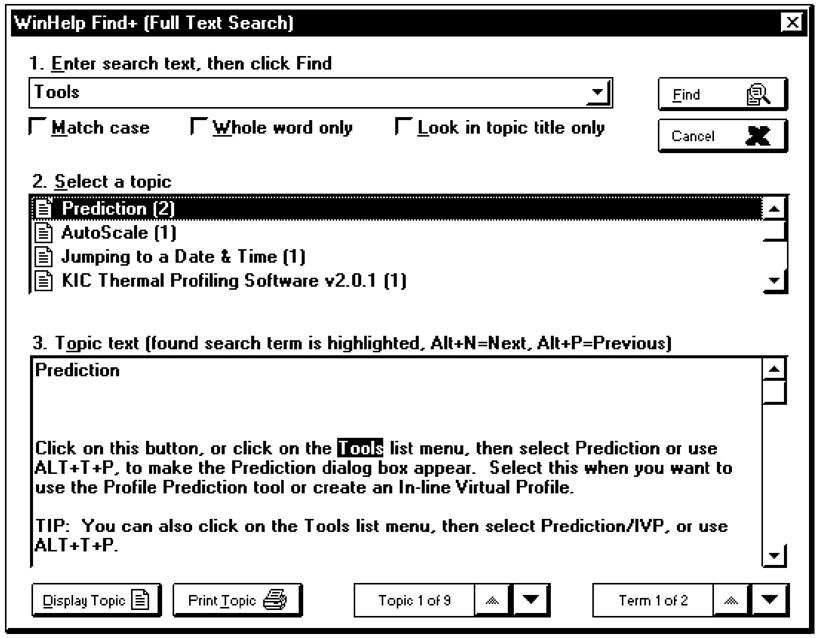
USING WINHELP FIND

To use the full-text search, just select the Find+ button or menu item, enter a word, and then select a topic to view. The complete steps are as follows:

- Open the Help system in WinHelp.
- Choose the **Find+** button or menu item. The WinHelp Find+ (Full Text Search) dialog displays.



- Enter the search word or phrase.
- Select the applicable search options:
  - ✓ **Match case** – The search is case-dependent, matching the uppercase and lowercase letters exactly as you entered them. For example, search on “Win” would not find “win.”
  - ✓ **Whole word only** – The search finds only entire words or phrases that match what you entered. For example, search on “win” would find the word “win” but it would not find “windows.”
  - ✓ **Look in topic title only** – The search only scans topic titles for the specified word or phrase—it does not scan the entire Help system text.
- Click **Find**.



Section 2 of the WinHelp Find+ dialog displays the titles of the topics in which the text is located. The number in parentheses is the number of occurrences of the text in the topic.

Section 3 of the WinHelp Find+ dialog displays the text of the selected topic with the search text highlighted. You can use the scroll bar to scroll through the text of the topic.

The Topic section (at the bottom of the dialog box) indicates how many topics were found that contain the search text.

The Term section (lower right corner) indicates how many times the text occurs in the selected topic.

- Highlight the title of the topic you want to view.

  The text of the selected topic displays in section 3 with the search text highlighted.

  Use the arrow buttons to move to the next occurrence of the text, or to the next topic.

- Click **Display Topic** to display the topic in WinHelp.
- Click **Print Topic** to print the topic.
- When you are finished using Find+, click **Cancel** to close the dialog.

USING THE HYPERVIEWER

ABOUT THE HYPERVIEWER

If you use the Windows File Manager, you will find the HyperViewer instantly familiar—the HyperViewer is to a Help system what File Manager is to a hard disk. Instead of displaying the files and directories on a hard disk, the HyperViewer displays the topics and hotspots in a Help system.

The HyperViewer includes the following features:

- The HyperView is built for you automatically and is a true representation of the hypertext links in the Help system.
- The HyperView is displayed as books and pages. Books are topics that contain hotspot links to more topics. Pages are topics that do not contain hotspots links to other topics.
- Jump topics and popup topics are represented by different icons so you can easily tell the difference just by looking at the HyperViewer.
- Jumps are indicated by the  icon.
- Popups are indicated by the  icon.
- You can print all topics or multiple topics from the HyperViewer.
- You can size the HyperViewer window and change the font.
- You can select Always on Top so that the HyperViewer window always displays.
- You can use the HyperViewer during development to check the structure of the Help system and to look for unlinked topics (topics to which no other topic jumps).
- If you make a change in the hypertext links during development of the Help system, the HyperViewer updates itself automatically.

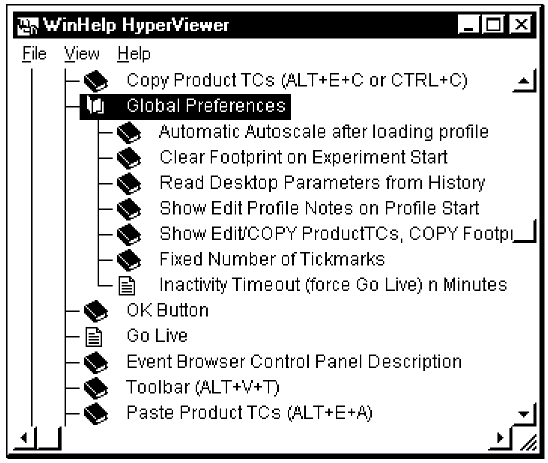
USING THE HYPERVIEWER

Opening the HyperViewer

To use the HyperViewer, just select the HyperViewer button or menu item, then select a topic to view. The steps are as follows:

- Open the Help system in the WinHelp Viewer.
- Choose the **HyperView** button or menu item. The HyperView window appears with the HyperView of the Help system displayed.

  Note: The first time you run the Help system, a dialog box appears with the message "Creating WinHelp HyperViewer Database". On a small fast computer, this will take just seconds. It may take a little longer on slower computers. This process happens only once for each Help file.



Moving Around the HyperViewer

Using the Mouse

- **Single Click on a Book** – Opens and closes a book.
- **Double Click on a Book** – Help system displays that topic.
- **Double Click on a Page** – Help system displays that topic.

Note: Navigating in the main Help window can change what is displayed in the HyperViewer. The current topic in the main Help window is highlighted in the HyperViewer. When you switch to another topic in the main Help window, the focus changes to that topic in the HyperViewer.

Printing TopicsUsing the Mouse

- **CTRL+Click** – Selects and deselects individual topics for printing.
- **Shift+Drag** – Selects multiple topics for printing.
- **CTRL+Shift+Drag** – Deselects multiple topics.

Navigating Using the Keyboard

- **Enter** – Help system displays the outlined topic.
- **Space bar** – Selects and deselects individual topics for printing.
- **Right Arrow** – Opens the tree one level for the outlined topic, so that all directly reachable topics are visible.
- **Left Arrow** – Closes the tree under the outlined topic.
- **Up Arrow** – Moves up by one line.
- **Down Arrow** – Moves down by one line.
- **Home** – Moves to the topic at the top of the display.
- **End** – Moves to the topic at the bottom of the display.
- **Page Up** – Moves up by one page.
- **Page Down** – Moves down by one page.

Closing the HyperViewer

To close the WinHelp HyperViewer window double-click on the HyperViewer system menu or choose **Exit** from the HyperViewer **File** list menu.

Customizing the HyperViewer Display

Unlinked Topics

Unlinked topics are topics that are not referenced by any other topic in the Help file. These types of topics are often included a Help system for context sensitive Help on specific buttons or areas of an application's display; they normally contain information that is not of general interest when navigating a Help file. For this reason, it is recommended that you leave this option turned off. With a very large file, including unlinked topics can slow down the display.

As a Help author, you may want to turn this option on to see which topics are unlinked in your Help system. There may be topics that you planned to create links to, but have not done so yet. This feature allows you to quickly identify them.

To show/hide unlinked topics, choose Unlinked Topics from the View list menu.

Current Branch Only

In a large Help system there will be several branches (for example, the Contents topics may branch to 5 topics). If you have navigated down several levels and wish to clear the display of extraneous information, you may want to limit the display to show only the current branch.

To display the current branch only choose **Current Branch Only** from the **View** list menu.

Always on Top

To set the HyperViewer window to Always on Top, choose **Always on Top** from the **View** list menu.

Font

To set the font for the HyperViewer window:

- From the **View** menu, choose **Font**.
- Select the font, style, and size.
- Click **OK**.

Print Multiple Topics

Printing ALL Topics

To print all of the topics in the Help system choose Print All Topics from the File list menu. WinHelp provides a message as each topic prints. Because of the way WinHelp prints topics, each topic will print as a separate print job on a separate page.

Printing Selected Topics

To print the multiple selected topics in the Help system:

- In the HyperViewer window, navigate until the titles for the topics you want to print are visible.
- Select the topics to be printed:
  - ✓ To select specific topics hold down the CTRL key and click on each topic with the left mouse button.
  - ✓ To select a sequence of adjacent topics hold down the Shift key and drag the mouse from the first to the last topic.

Note: Topics that have been selected for printing are indicated by a check mark (✓) next to the topic text.

- From the File menu, choose Print Selected Topic(s).
- To deselect topics, use CTRL+Click or CTRL+SHIFT+Drag.

Printing Tips

Clicking on topic text without holding down the **Shift** key will clear all topics that were selected for printing.

Only visible topics can be selected for printing. If you close a branch of the tree, those topics that disappear will not be selected.

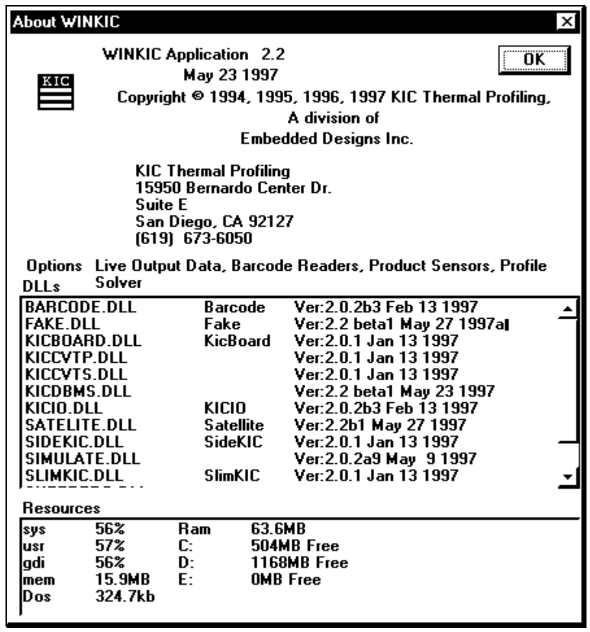
You can toggle whether a topic is selected for printing by holding down the **Control** key and clicking with the left mouse button.

About the KIC Software

OVERVIEW

This feature is instrumental in providing information about the hardware and software setups. If you contact KIC Technical Support, this information may be needed to provide the Technical Engineer with more insight about the operation of a particular setup. When selected, the **About WinKIC** dialog box will appear.

To open this dialog box, select it from the help list menu or press ALT+H+A.



This dialog box contains the following information:

- Version number of the KIC software
- How to contact KIC Thermal Profiling - the KIC Technical Support line is available 24 hours a day, 365 days a year. If you contact KIC Technical Support outside our normal working hours (7:00am ~ 5:00pm Pacific Time) you have the option of either leaving a message or paging a Technical Engineer. Normally, we will respond to your page within 30 minutes.
- Dynamic Link Libraries (DLL) in use, with version numbers and compile dates - depending upon which KIC software version is in use, these DLL's will reflect the dates the DLL's were compiled as well as their version numbers.
- Computer resource available—these include:
  - ✓ System resources available
  - ✓ User resources available
  - ✓ GDI resources available
  - ✓ Virtual Memory available
  - ✓ DOS memory available
  - ✓ Total amount of physical RAM installed
  - ✓ Total mount of hard drive memory available

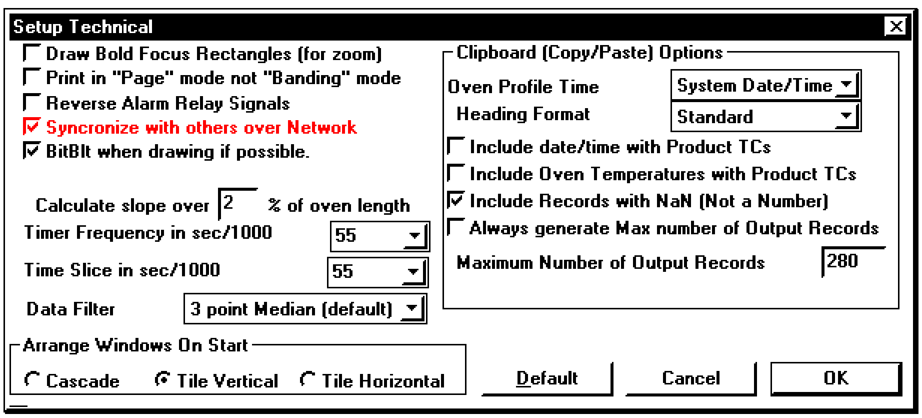
APPENDIX A: NETWORK SETUP

Prerequisites

You must be running one of below operation systems on both the Server system as well as all Clients:

- Windows for Workgroups
- Windows 95
- Windows NT

The KIC software's Technical Setup must have the **Synchronize with others over the Network** box checked and the Server system must have a hard drive selected for sharing (both read/write) where the KIC Software will send the information. Each Client should be at least be running a Pentium™ class processor.



In the **[Technical]** section of the **WinKIC.INI** file for each client, the following line must be modified:

From: BufferLength=16384

To: **BufferLength=4096**

File Sharing Setup for Windows for Workgroups

A hard drive on the Server must be setup for file sharing. To setup a shared drive for a Windows for Workgroups 3.11 server:

- Open File Manager on your server.
- Make sure your C:\ drive is selected
- Click on the root C:\ directory
- Go to the menu item Disk/Share As
- Your share name should be "C"
- Your path should be "C:\"
- "Re-share at Startup" should be checked
- Access Type should be "Full"
- Click "OK"

Reading from Windows for Workgroups Clients

To read from your Windows for Workgroups 3.11 client:

- Open File Manager on your client computer.
- Go the menu item Disk/Connect Network drive
- Your "Drive" selection should be the next available device (i.e., D, E)
- Your "Path" should be "\\SERVERNAME\C", where SERVERNAME is the name of your server.
- Click "OK"

File Sharing Setup for Windows 95

To setup a shared drive for a Windows 95 server:

- Open Windows Explorer on your server.
- Make sure your C:\ drive is selected
- Go the menu item File/Properties
- Click on the "Sharing" tabbed dialog
- Click on "Shared As"
- Your share name should be "C"
- Access Type should be "Full"

Reading from Windows 95 Clients

To read from your Windows 95 client:

- Open Windows Explorer on your client computer
- Go to the menu item "Tools/Map Network Drive"
- Your "Drive" selection should be the next available device (i.e., D, E)
- Your "Path" should be "\\SERVERNAME\C", where SERVERNAME is the name of your server.
- Reconnect at logon should be checked.
- Click "OK"

This should connect your client and server computers. Install the KIC software onto the client from floppies and open the oven in your new networked directory. (Assuming you have installed the KIC software on your server).

Note: The KIC software <u>should not</u> be installed on the clients from the server, otherwise some of the system files needed to run the KIC software will be installed to the server system sub-directory rather than the client system sub-directory.

Now all data will be written over the network to your server.

Operation Over the Network

The oven, recipe and product files will reside on the Server. The KIC software will reside on the Clients. Operations on the data will only be available to those Clients running the KIC software. The KIC software is freely distributable.

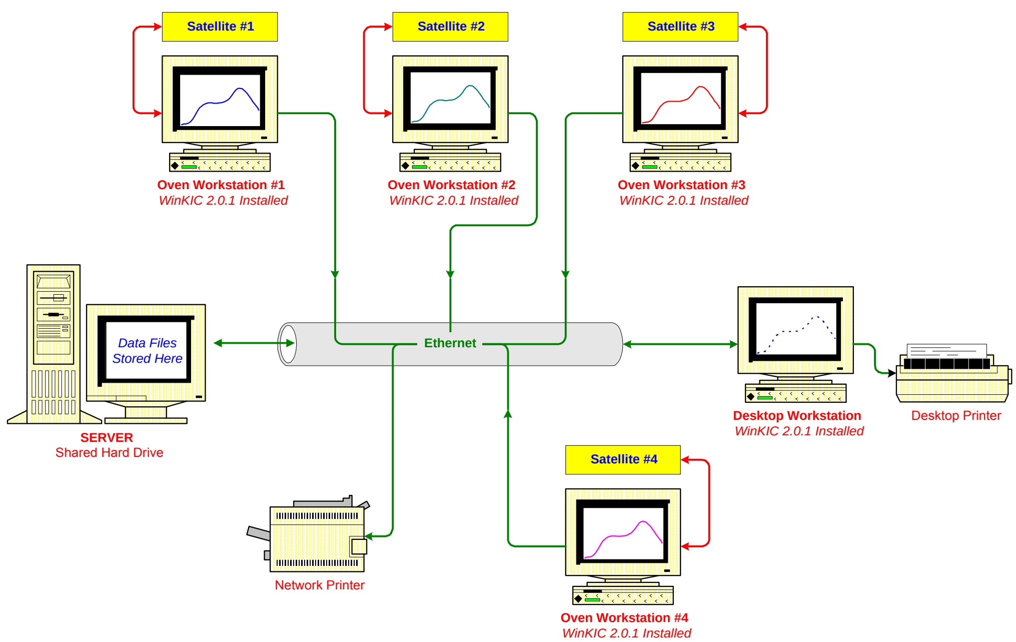
As temperature data is collected from the oven via the KIC Thermocouple Processing Unit (Satellite), the respective Client will immediately forward this data to the server's shared hard drive where it will be written into a distinctly separate sub-directory from all other ovens. Each oven's recipes and notes files are stored in this same sub-directory.

The product's sub-directory, when also stored on the server, will allow sharing of the product setups among each Client, making it effortless to migrate a product from one manufacturing line to another.

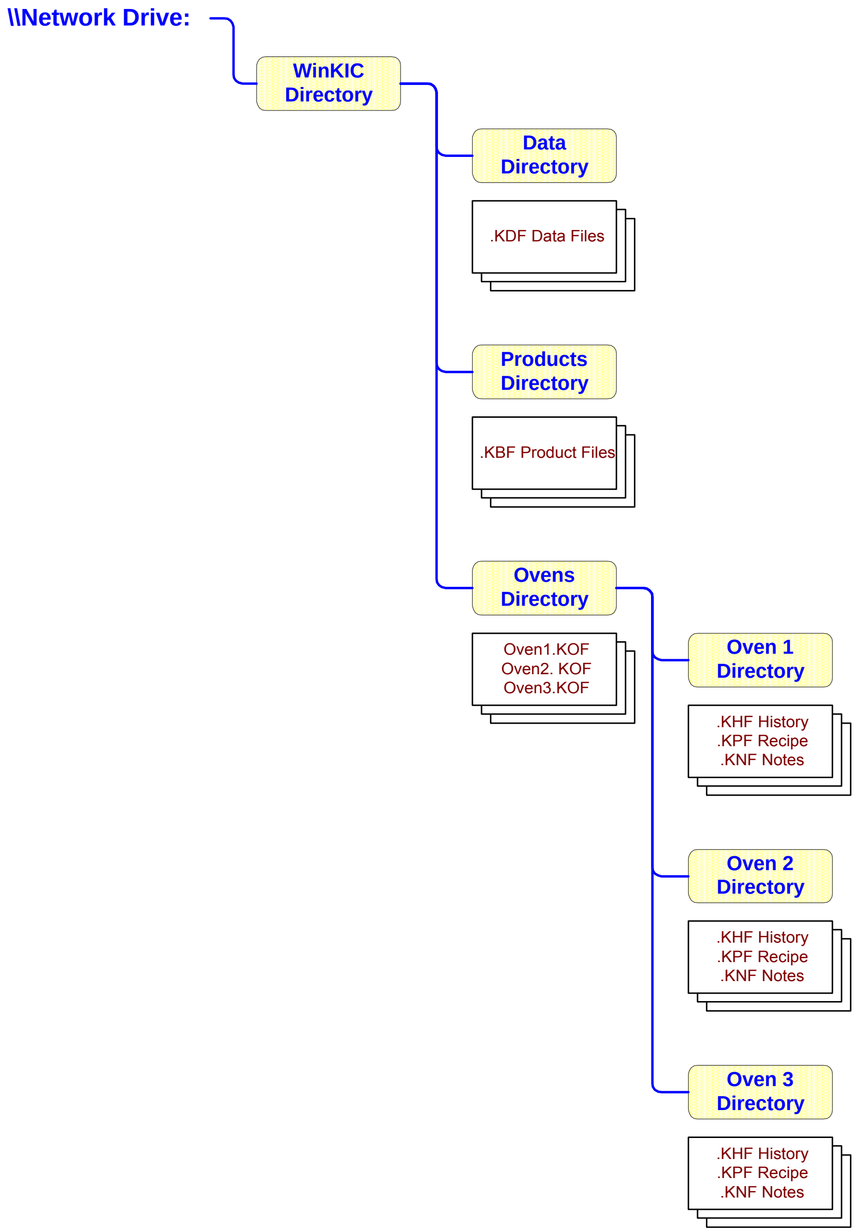
You may choose to maintain a special data sub-directory on the Server as well. Although it is not really necessary for this sub-directory to exist in order to use KIC software it can provide a common directory for placing Data files, created by users reviewing the History files on the Client.

Once setup, using KIC software within a network is straight forward. Although the KIC application will reside on the Clients, all the setup and history information is maintained on the Server.

For the sake of simplicity, it's recommended that the default directory tree that the KIC software usually creates on the Client's local drive be mirrored on the Server's shared hard drive.



Network Directory Structure



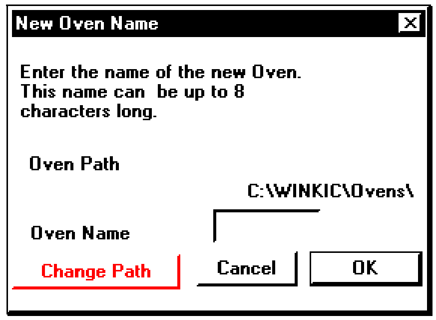
All the normal Windows conventions used for navigating network drives is maintained. **However, long file names are not currently supported.**

Creating New Setups on a Network

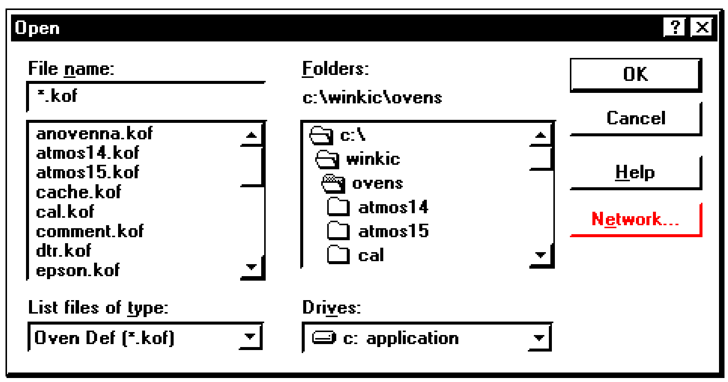
When creating new setups for ovens, products and recipes, access to loading and saving files to a network drive is available in the respective dialog boxes via the **Network** button.

Example Used: Creating a New Oven

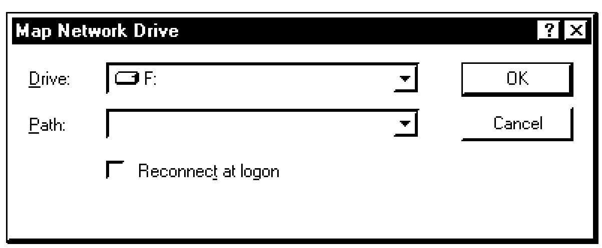
- Select **New** for the File list menu. The **New Oven Name** dialog box appears.



- Input the new **Oven Name**, then select the **Change Path** button. The **Open** dialog box appears.



- Select the **Network** button. The **Map Network Drive** dialog box appears.



- Select the **Drive** and input the **Path** where this new oven file setup will be stored.
- Click the **OK** buttons of each dialog to confirm the setup

APPENDIX B: SOLDER POT DWELL TIME MEASUREMENT

The SlimKIC Transmitter/Data Logger will identify a channel without a thermocouple plugged in as "OPEN". A thermocouple with the tip open or broken is identified as an "OPEN" as well.

This feature can be used to measure the dwell time in a wave solder process. As the two wires at the tip of the open thermocouple pass through the wave, the open circuit is closed by the conductive solder and the SlimKIC starts to take readings.

Once the wires leave the wave, the circuit is no longer closed so that the SlimKIC reads "OPEN" again. The software can tell you how long it was recording temperatures while the thermocouple was passing through the wave, thus giving you the "Dwell Time".

The hardware in the SlimKIC is setup to enhance this procedure. Each thermocouple runs through a filtering capacitor. This capacitor causes a slight delay in the time it takes to register the thermocouple as "OPEN".

Removing the jumper on JP1 and JP2 will bypass this capacitor, eliminating the delay and increasing the accuracy of the measurement in terms of time.

Use TC1 or TC2 to measure the dwell time by following these steps:

- Place the SlimKIC in front of you with the metal cover removed. With the TC inputs on your left, on the top left center of the circuit board, you will find JP1 and JP2. Remove the jumper on JP1 to use TC1 to measure the dwell time. Remove the jumper on JP2 to use TC2 to measure the dwell time.
- Take a single thermocouple and open the tip of the TC, leaving two separate wires extending from the end. This can be done by cutting off the bead at the end of the TC.
- Attach the other TC's as you normally would. Place TC1 or TC2 (whichever one you removed the jumper for) over the front edge of the PCB, or through holes made in the board. Make sure the bare wires at the end of the TC are separated, but keep them within ½" of each other. The TC end with the two wires should hang over the board far enough so they dip into the wave. Ideally, they wire depth should be flush with the bottom of the board. If they're too high, or low, you dwell time may be skewed.
- Run your profile as usual. The thermocouple you used to measure dwell time (1 or 2) will read OPEN until it contacts the conductive solder in the wave(s). At this point it will measure temperatures because the wave has closed the circuit at the end of the thermocouple. When the thermocouple leaves the wave, the circuit will be OPEN again, and will no longer take temperature readings.

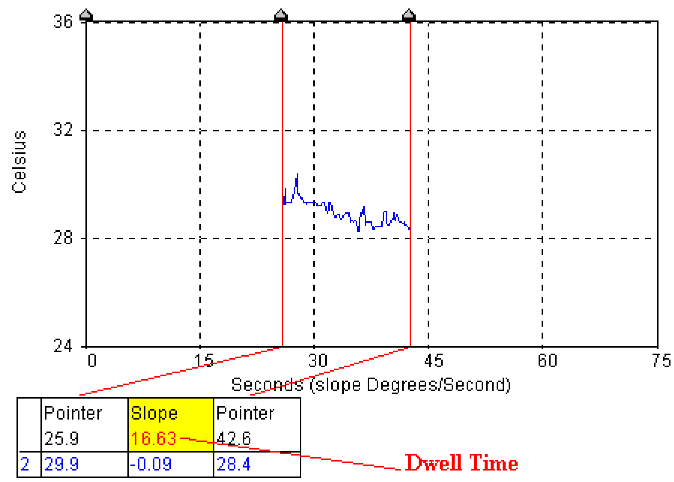
  Note: You will need to use the KIC software's Pointer Tool to examine the dwell time. To enable viewing of this dwell time, you will need to ensure that you recipe's statistics group has the Slope Between Pointer Locations box checked.

  This column of statistics will not necessarily be used in this instance to present you with slopes between Pointer locations, but rather the difference, in time or distance, between the Pointers. To measure the time difference, ensure that your X-axis scale is setup to display a time (i.e., minutes, seconds, etc.). To measure the distance, ensure that your X-axis scale is setup to display a distance (i.e., inches, centimeters, etc.).

- After finishing the profile, use Pointer tool to place a Pointer mark at the place where the temperature readings started, and a Pointer mark at the place where the temperature readings ended.
- The dwell time or distance can be read at the top of the Slope column situated immediately between the two Pointer columns.

  Note: This configuration of the SlimKIC without JP1 and/or JP2 installed is meant to be used to measure <u>dwell time or distance only</u>. Without the capacitor jumped, the temperature readings loose their accuracy in terms of measured temperature, and therefore should not be used as a basis for analyzing temperatures.

  Be sure to replace the jumper(s) if you are using TC1 or TC2 for product temperature measurements.



APPENDIX C: FILE ARCHIVING

Eventually there will come a time where it will be advantageous to archive the history files off the computer hard drive and onto an another memory medium. Typically, data that is older than 2 years may no longer be pertinent to your current process.

Whenever the KIC software's history files are "moved" somewhere else, it is paramount that the Event Browser be "rebuilt". The Event Browser is actually an index listing of the events found inside each history file.

This index contains the memory locations in the history files for each event and provides a quick means of accessing the data without the need to endlessly page through each event in each history file in order to locate it.

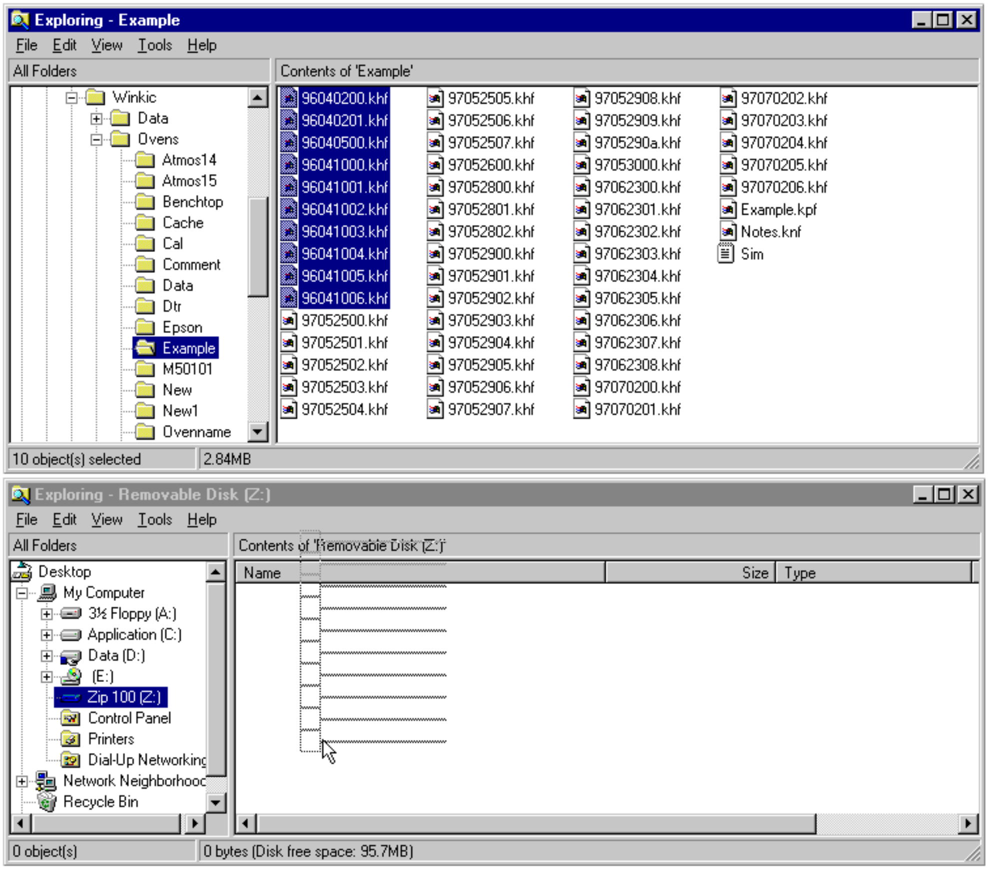
When a group of history files are moved to another location (i.e., backed-up somewhere else) the KIC software has no means of knowing that you did this, and expects the data locations listed in the Event Browser index to remain in affect.

If the Event Browser index is not rebuilt, and you select an event from the Browser that no longer exists, a SQL (pronounced "see-quel") error will occur which will necessitate closing the KIC software application and possibly rebooting the computer. Therefore, it is imperative that you follow these directions closely to avoid causing any problems.

To properly archive the history files, follow these procedures:

- Close the KIC software if it's currently running.
- Using the Windows 3.1 File Manger, or the Windows 95/NT Desktop Explorer, go to the C:\WinKIC\Ovens*YOUROVEN* subdirectory.

  Note: Substitute the YOUROVEN with the name of the oven.
- Select the range of history files you wish to archive. The files are automatically named by the KIC software in the following format – **YYMMDDXX.KHF**, where:
  - ✓ **YY** – is the last two digits of the year.
  - ✓ **MM** – is the month.
  - ✓ **DD** – is the day.
  - ✓ **XX** – is the numerical order that the file was created for a particular day.
  - ✓ **KHF** – is the file extension used to denote this file as a **K**IC **H**istory **F**ile.
- Move the files to the backup media and close the File Manger or Desktop Explorer when finished.



In the above example, all files from April, 1996 were selected for the oven named "Example" and moved onto a removal media drive for archiving. This archive media will typically be placed in a safe and secure place in the event that this data is ever needed again.

- Start the KIC software.
- Open the oven file for which you just archived the history files. **DO NOT** select any events from the Event Browser just yet.
- Select **Rebuild Browser Event List** from the **Tools** list menu. The **Event Browser Options** dialog box will appear.
- Input your preferences in the **Event Browser Options** dialog box, then select OK. The KIC software will begin recompiling an index of only those events in the history files that remain on the hard drive.
- When the rebuild is complete, select the **OK** button.
- It is now safe to select items from the Event Browser.

APPENDIX D: GLOSSARY

Absolute Zero - The temperature at which thermal energy is at a minimum. Defined as 0 (zero) Kelvin, calculated to be -273.15°C.

Adapter -- A mechanism or device or attaching non-mating parts.

Ambient -- The surrounding environment that contacts the system, assembly or component of interest.

ASCII -- American Standard Code for Information Interchange. A seven or eight bit code used to represent alphanumeric characters. It is the standard code use for communications between data processing systems and associated equipment.

ASME -- American Society of Mechanical Engineers.

ASTM -- American Society for Testing and Materials.

Attributes – Qualitative data that can be counted for recording and analysis.

Average – This is the mean point in the frequency distribution where the greatest number of observations lie. If is signified by X-Bar and is calculated by totaling the observed values and dividing by the number of observations.

Average Deviation -- Also referred to as the "AD", this phrase is a statistics used to describe the average difference between a previously measured temperature and the current temperature.

AWG -- American Wire Gage.

Belt speed -- This is the term we'll use to refer to the oven's conveyor speed. It will sometimes be abbreviated as "BS" both in this manual and in the KIC software. It is the mechanism by which the product is moved through the oven.

Benchmarking -- An improvement process in which an organization compares its performance against best-in-class organizations, determines how those organizations achieved their performance levels, and uses the information to improve its own performance. The subjects that can be benchmarked include strategies, products/programs/services, operations, processes and procedures.

Bimodal Distribution – This is a distribution which has two identifiable curves within it with different averages. This indicates a mixing of two populations such as different shifts, machine, workers, etc.

Boiling Point -- The temperature at which a substance in the liquid state transforms to the gaseous state. Commonly refers to the boiling point of water which 100°C (212°F) at sea level on a standard day.

Boundaries -- The natural limits of a process, defined as where the process begins and where the process ends.

BTU -- British Thermal Unit. The quantity of thermal energy required to raise one pound of water at it's maximum density, 1°F. One BTU is equivalent to .293 watt hours, or 252 calories. One kilowatt hour is equivalent to 3412 BTU.

Calibration -- The process of adjusting an instrument or compiling a deviation chart so that it's reading can be correlated to the actual value being measured.

Cause & Effect Diagram – Also known as a Fishbone Chart, this type of diagram was developed to represent the relationship between some "effect" and all the possible "causes" influencing it. The effect or problem is stated on the right side of the chart and the major influences or "causes" are list to the left. The major causes

might be summarized under four categories referred to as the **4M's**: **Manpower**, **Machines**, **Methods** and **Materials**. In administrative areas it may be more helpful to use the **4P's**: **Policies**, **Procedures**, **People** and **Plant**.

Cavitation -- The boiling point of a liquid caused by a decrease in the pressure rather than an increase in temperature.

Celsius -- a.k.a. Centigrade, a temperature scale defined by 0°C at the icing point and 100°C at the boiling point of water at sea level on a standard day.

Check Sheets – These are simply an easy to understand form used to answer the question, "How often are certain events happening?" It starts the process of translating "opinions" into "facts".

Common Cause -- Predictable normal random variation present in every process due to the combination of existing inputs. This is a source of variation that is always present; part of the random variation inherent in the process itself. Its origin can usually be traced to an element of the system which only management can correct.

Control Chart – This is simply a Run chart with statistically determined upper (UCL or Upper Control Limit) and lower (LCL or Lower Control Limit) lines drawn on either side of the process average. This is a graphic representation of a characteristic of a process, showing plotted values of some statistic gathered from that characteristic, and one or two control limits. It has two basic uses; as a judgement to determine if a process was in control, and as an aid in achieving and maintaining statistical control.

Control Limit – This is a line (or lines) on a control chart used as a basis for judging the significance of the variation from subgroup to subgroup. Variation beyond a control limit is evidence that special causes are affecting the process. Control limits are calculated from process data and are not to be confused with engineering specification.

Consensus -- The collective opinion of a group on the discussion of an issue until all agree and everyone is willing to accept the decision.

Constancy of Purpose -- The first of Dr. Deming's Fourteen Points. Long-term planning that is based on meeting and exceeding. The allocation of resources, research and education designed to meet the organization's future needs.

Continual Improvement -- Refers to the philosophy whereby every system or process within the organization is subject to continual scrutiny and improvement. Continual improvement is the antithesis of the philosophy which says, "If it ain't broke, don't fix it." Continual improvement requires that "If it ain't broke, it can be made better."

Convection -- Heat transfer that occurs at the interface of a solid and fluid or gas due to temperature differences.

Convection/IR -- A type of reflow oven that uses a combination of convection and radiation to transfer heat.

Cooldown -- The period in the reflow process, after peak temperature, during which the temperature falls to the point where the solder joints solidify or freeze.

Culture -- A prevailing pattern of activities, interactions, norms, sentiments, beliefs, attitudes, values and products in an organization. The shared experience of a group.

Cultural Change -- A change in the values, standards and daily conduct within an organization.

Customer -- Anyone who receives or consumes goods or services. This includes internal customers who consume or receive goods and services produced within the organization.

Customer Focus -- Related to the needs of both internal and external customers. Understanding that meeting or exceeding the needs of the customer must drive the vision of the organization and that all improvement must be customer driven.

Cycle Time -- The interval required to complete a task, or function, starting from the beginning of the first step until the completion of the last.

Data -- Facts which must be gathered and analyzed for information. Only data gathering and analysis permits one to "speak with facts."

Data Management -- The process by which the reliability, timeliness, and accessibility of an organization's data base is assured.

Density -- Mass per unit of volume of a substance.

Deployment -- The systematic process of introducing an activity or process to all applicable areas of an organization.

Deviation -- The difference between the value of the controlled variable (KICprobe temperatures) and the value (target temperature) at which it is being controlled.

Dialog Box -- These are the boxes that appear on the screen of the computer monitor in the Windows environment. Most dialog boxes will prompt the user to make choices. Others are simply interrogative in nature.

Distribution – This is the statistical pattern into which observed values fall, and is based on the concept of natural variation that states that anything measured repeatedly will arrive at different results. These results will fall into statistically predictable patterns. A bell shaped curve (normal distribution) is an example of a distribution in which the greatest number of observations fall in the center with fewer and fewer observations falling evenly on either side of the average.

Diversity -- The characteristic of a workforce which is a result of individual differences between its members. Specific differences may include: gender, workforce minorities, or individual disabilities. Workforce diversity can be a major organizational strength if the knowledge, abilities, and strength of individual workers are recognized and respected.

Effectiveness - Meeting agreed-upon requirements for supplier inputs and customer outputs.

Efficiency -- Minimizing time and/or other resources spent on activities which do not add value.

Efficiency vs. Effectiveness -- Effectiveness is doing the right thing--meeting agreed-upon customer requirements; efficiency is minimizing resources spent which do not add value to a product/service. It is important to be both effective and efficient. Goals cannot be achieved by doing the wrong things efficiently.

Employee Involvement -- A practice within an organization whereby employees regularly participate in making decisions on how their work is done, including making suggestions for improvement, planning, goal setting, and monitoring performance.

Empowerment - A condition whereby employees have the authority to make decisions and take action on their own without prior approval.

Eutectic Temperature -- The lowest possible melting point of a mixture of alloys.

Fahrenheit -- A temperature scale defined by 32° at the ice point and 212° at the boiling point of water at sea level on a standard day.

Facilitator -- A person knowledgeable in process improvement, problem solving and group dynamics who assists teams and team leaders by serving as coach, communicator, coordinator, promoter and teacher as needed.

Fillet -- The concave junction formed by the solder between the footprint pad and the surface mount component lead or pad.

Flow Chart – This is a pictorial representation showing all of the steps of a process. Flow Charts provide excellent documentation of a program and can be a useful tool for examining how various steps in a process are related to each other.

Forced Convection -- A type of reflow oven in which the principal heat transfer mechanism is convection.

Frequency Distribution – This is a statistical table that graphically presents a large volume of data in such a way that the central tendency (average/mean, etc.) and distribution are clearly displayed.

Heat Sink -- A body which can absorb thermal energy.

Heat Transfer -- The process of thermal energy flowing from a body of high energy to a body of lower energy. Means of transfer are: Conduction, Convection, Radiation.

Heat -- Thermal energy. Heat is expressed in units of calories or BTU's.

Histogram – A histogram takes measurement data and displays its distribution. It can reveal the amount of variation that any process has within it.

Human Resource System -- The human resource system develops the empowered human resources to maintain and operate the integrated quality system. This includes training, assessment, recognition, involvement, and internal customer well being and satisfaction.

Indicator -- An identified measure of a process.

Information System -- The information system manages the scope, validity, reliability, selection and maintenance of quality and performance data and information. The system also provides comparative information and benchmarks. The data and information is then used to monitor and improve the integrated systems.

Infrared Radiation -- The band of electromagnetic wavelengths lying between the extreme of the visible and the shortest microwaves. The strong absorption of infrared by many substances renders it a useful means of heat energy transfer.

ISA -- Instrument Society of America.

Isothermal -- A process or area that is a constant temperature.

Joule -- The basic unit of thermal energy.

Kaizen -- This is the Japanese word for improvement. Kaizen implies more improvement in basic production processes. Kaizen represents a philosophy whereby an organization, and the individuals within it, undertake continual improvements of all aspects of organizational life.

Kelvin -- The unit of absolute or thermodynamic temperature scale based upon the Celsius scale 100 units between the ice point and boiling point of water. 0°C = 273.15K (there is no degree symbol used with the Kelvin scale)

Key Performance Indicators -- Measurement(s) which determine if the critical success factor was successfully achieved.

Laser Reflow Soldering -- Focused heat energy from a CO_2, Nd:YAG, etc. source that is directed to specific points on the printed circuit board to reflow joints very quickly.

Latent Heat -- Expressed in BTU per pound. The amount of heat needed (absorbed) to convert a point of boiling water to a pound of steam.

Leadership -- A leader in a quality organization has an unshakable commitment to quality and helps people do a better job through coaching, facilitating, and by creating environments that support the aim of the organization. The leader understands and supports the constancy of purpose of the organization.

Maximum Deviation -- Also referred to as the "MD", this phrase is a statistics used to describe the greatest difference between a previously measured temperature and the current temperature, of all the points considered.

Management by Fact -- A key focus of total quality management. All employees manage the work they do by collecting objective data and making decisions based on this information.

Mean Temperature -- The average of the maximum and minimum temperature of a process equilibrium. As used in the KIC software, it is the sum of the values, divided by the number of thermocouples currently being viewed. If you deselect a particular thermocouple for viewing, it is not included in this calculation.

$$\frac{\sum n}{n}$$

Measurement -- The act or process of measuring to compare results with requirements. A quantitative estimate of performance.

Melting Point -- The temperature at which a substance transforms from a solid state to a liquid state.

Mission - The purpose and focus of an organization. The mission is generally defined in terms or products and services of an organization.

Non-conformities – These are specific occurrences of a condition which does not conform to specifications or other inspection standards; sometimes called discrepancies or defects. An individual non-conforming unit can have the potential for more than one non-conformity.

Non-Value Added -- Activities or work which do not directly contribute to the product or service meeting the needs of the customer. Such non-value added activities can include storage, transportation, review, appraisal, inspection, rework, etc.

Operational Definition -- A definition that describes a word in measurable, observable, functional terms so there can be clear agreement about the meaning of the term. Operational definitions are very important to ensure clarity of intent with a built-in description of the essential features so the meaning of the term can be independently verified.

Optimization - A process of orchestrating the efforts of all components toward achievement of the stated aim so everyone gains.

Outputs - Things and information which are the end result of an activity (product, reports, services, information, etc.)

Oven -- The oven we refer to is a conveyorized machine used to introduce temperature variations in a product through the use of convection, conduction, or radiation heating methods.

Pareto Chart – A Pareto diagram is a special form of vertical bar graph which helps to determine which problems to solve in what order. Creating a Pareto chart based

upon either check sheets or other forms of data collection, helps to direct attention and effort to the truly important problems. You may generally gain more by working on the tallest bar than tackling the smaller bars.

Partnering -- The establishment of a long term relationship between two parties characterized by teamwork and mutual trust, allowing both parties to focus on the needs of a mutual customer or client/constituent. Partners share risks as well as benefits. Partnering arrangements can be with labor, management, employees, suppliers, government and educational institutions.

PCB -- Printed Circuit Board (a.k.a. printed wiring board)

PDSA -- The continual improvement cycle, or Shewhart Cycle, PLAN, DO, STUDY, ACT. An iterative process that begins with planning an improved process, testing the new process on a small scale, studying the results through the collection of data, taking appropriate action based on the data, then planning the next iteration of improvement. The cycle is repeated indefinitely.

Performance Improvement -- A philosophy and set of guiding principles which represent the foundation for continuously improving the organization through employee involvement. The application of quantitative methods and human resources to improve the materials and services supplied to and by an organization, and all the processes within the organization and the degree to which the needs of the customer are met. The integration of fundamental management techniques, existing improvement efforts, and technical tools under a disciplined approach to focus on continuous improvement.

Performance Standard -- A goal against which actual performance is measured.

Population – This is the universe of data under investigation from which a sample will be taken.

Potentiometer -- A variable resistor often used to control a circuit.

Preheat -- Generally referring to a process portion of the reflow heat curve where the product is heated from ambient at a determined rate so that the shock of sudden reflow temperatures is avoided.

Prevention -- A future-oriented approach to quality management which achieves quality improvement through corrective action on a process. Prevention is consistent with a philosophy of never-ending improvement.

Problem -- An opportunity for improvement or undesirable condition, often manifested by symptoms, created by root causes which must be systematically identified and eliminated to control the problem.

Procedures -- Step-by-step tasks which are necessary to meet standards; a method or manner of proceedings. How to meet standards.

Process -- A systematic and defined method of doing something. A process generally involves a number of steps or operations and is the combination of people, machine, equipment, raw materials, methods and environment that produces a given product or service.

Process Capability (Cp, Cpk) – The measured, built-in reproducibility (consistency) of the product turned out by the process. Such a determination is made using statistical methods, not wishful thinking. The statistically determined pattern or distribution can only the be compared to specification limits to decide if a process can consistently deliver product within those parameters.

Process Improvement -- Improving processes is how a quality organization improves its results. Process improvement should be accomplished by those who

best know the process. Process improvement includes all steps in how an organization designs, develops, implements and evaluates its services and programs. A common problem in many organizations is that leaders often find themselves too involved with process issues on a daily basis, leaving little time for important strategic and alignment issues.

Process Management Systems - The process management system is the system of processes that are designed and delivered to support the quality integrated system.

Product -- The "product" that we refer to in this document is a printed circuit board (PCB) which is often times referred to as a printed wiring board (PWB). For the purposes of this manual, these two phrases are synonymous, and we will often use "printed circuit board" when describing or referring to the product. The actual product may be anything that is being processed by heat.

Profile -- A graph of time vs. temperature.

Profile Prediction -- This is the phrase that KIC uses to describe the ability of using a known profile to simulate oven recipe changes on the computer.

Quality Assessment -- The operational techniques and activities used to evaluate the quality of processes, practices, programs, products and service.

Quality Conformance -- Conformance to valid requirements which are defined by the customer.

Quality Control -- The operational techniques and activities used to ensure that quality standards are met.

Quality Process Tools -- Statistical methods capable of producing data to be used in the PLAN or STUDY step of the improvement, PDSA, cycle. The seven simple tools include: flow charting, cause and effect diagrams, Pareto analysis, control charts, run charts, histograms, and scatter diagrams. More powerful or advanced tools, which are useful as planning and design tools, include quality function deployment, QFD, and process capability analysis.

Quality Values -- The principles and beliefs that guide an organization and its people toward the accomplishment of its vision, mission and quality goals.

Range – As used in the KIC software, this is sometimes referred to as "delta-T" and is range is calculated by taking the minimum value in a column of statistics, and subtracting it from the maximum value. If you deselect a particular thermocouple for viewing, it is not included in this calculation.

$$n_{\max} - n_{\min}$$

Rankine -- An absolute scale based upon the Fahrenheit scale with 180° between the ice point and the boiling point of water. 459.67°R = 0°F.

Recipe -- The "recipe" is the term KIC uses to describe what some call the "process". It refers to the combination of oven temperature setpoints and conveyor speed.

Recognition -- Appreciation or acknowledgment of a job well done.

Reflow Soldering -- A process for joining parts to a substrate by placing parts' leads into a solder paste and then reflowing the solder and making the interconnection. Also referred to as the reflow process.

Requirements -- **(1)** Customers have requirements or needs. If organizations are listening to customers, they will clearly identify customer requirements. The

challenge for organizations is to translate these requirements into precise product/service specification; **(2)** Laws, statutes, rules, procedures, policies, specifications, objectives, goals, operating directives, performance standards, etc.

Rework -- Repeated work required when a process fails or standards are missed.

Root Cause -- The major contribution to nonconformance, the prime cause of a problem. The root cause(s) must be eliminated to assure quality by eliminating or significantly reducing the problem (nonconformance) created by the root cause.

Run Chart – These are employed to visually represent data and are used to monitor a system to see whether or not a long range average is changing. Run Charts are the simplest tool to construct and use. Points are plotted on the graph in the order in which they become available. These charts are often employed when graphing machine downtime, yield, scrap, typographical errors or productivity as they vary over time.

Runs – These are the patterns in a control chart within which a number of points line up on only one side of the central line. Beyond a certain number of consecutive points (statistically based) the pattern becomes unnatural and worthy of attention.

Sample – This is one or more individual events or measurements selected from the output of a process. A sample is that which is taken from a population for the purposes of identifying characteristics and performance of the whole.

Satellite -- "Thermocouple Processing Unit" and "TPU", are synonymous with the term "Satellite", and are used throughout this document.

Scatter Diagram – The type of diagram is used to study the possible relationship between one variable and another and is employed to test for possible cause and effect relationships. It cannot prove that one variable causes the other, but it does make it clear whether a relationship exists and the strength of that relationship.

Seebeck Effect -- When a circuit is formed by a junction of two dissimilar metals and the junctions are held at different temperatures, a current will flow in the circuit caused by the difference in temperature between the two junctions. This is the principle behind how thermocouples operate.

Setpoint -- The temperature at which a controller is set to control a system.

Sigma – Abbreviated as σ **,** this is the Greek letter used to designate a standard deviation.

Slope -- The term "slope" is a statistics used to describe the rate of temperature rise or fall over a period of time (temperature over time).

SMOBC -- Soldermask over bare copper. A printed wiring technology that protects bare copper connectors with a mask exposing only the component land patterns to solder plating.

SMT -- Surface Mount Technology.

Span -- The difference between the upper and lower limits of a range expressed in the same units as the range.

Special Cause – This is a source of variation that is intermittent, unpredictable, unstable ; sometimes called an assignable cause. It is signalled by a point beyond the control limits.

Specific Heat -- The ratio of thermal energy required to raise the temperature of a body 1° to the thermal energy required to raise an equal mass of water 1°.

Specification – This is the engineering requirement for judging acceptability of a particular characteristic. Chosen with respect to functional or customer requirements for the product, a specification may or may not be consistent with the demonstrated capability of the process (if it is not, out-of-specification parts are certain to be made). A specification should never be confused with a control limit.

Standard -- A rule or measure by which a finished product will be measured. A rule established to create a yardstick for measuring or guiding quantity, quality, value, etc. A vehicle for communication.

Standard Deviation - This is a measure of the spread of the process output of the spread of a sampling statistic from the process (e.g., of subgroup averages); denoted by the Greek letter σ (sigma). As used in the KIC software, standard deviation is calculated using the population. The population is a column of other thermocouple statistics. If you deselect a particular thermocouple for viewing, it is not included in this calculation.

$$\sqrt{\frac{n\sum x^2-\left(\sum x\right)^2}{n(n-1)}}$$

Statistical Control – Is the condition describing a process from which all special causes have been removed, evidenced on a control chart by the absence of points beyond the control limits and by the absence of non-random patterns or trends within the control limits.

Statistical Process Control (SPC) – This is the use of statistical techniques such as control charts to analyze a process or its output so as to take appropriate actions to achieve and maintain a state of statistical control and to improve the capability of the process.

Statistics -- The term “statistics” is used throughout this document to describe limits and variations used in conjunction with surface mount technology thermal profiling. These include “time-above” , “time-between”, maximum, and minimum temperatures.

Strategic Direction -- The vital few priority areas identified by leaders to be of highest importance in meeting customer requirements. Strategic direction establishes a major area of focus defined during the initial steps of long-range organizational (strategic) planning.

Strategic Planning -- Strategic Planning, led by executive management, is long-range planning for an entire organization based on meeting valid customer requirements. Operational planning translates the strategic goals into strategies, initiatives and actions for accomplishing strategic goals.

Strategies -- A strategy is a series of planned and sequenced tasks, which together allow for achievement of the critical success factor. Strategies must be clearly stated, observable and measurable.

Surface Mount Technology -- A manufacturing process whereby small electronic components are mounted on a thin layer of solder paste atop a printed circuit board, then heated until the solder reflow, attaching the components to the board.

Surface Tension -- The molecular force existing in the surface film of all liquids, which tends to contract the volume into a form consuming the least surface area.

System -- A set of well-defined and well-designed processes for meeting the organization's quality and performance requirements.

Systems Alignment -- The degree to which the subsystems, processes or components of a system are linked and working together in the same direction to achieve common goals. Alignment of an organization's processes is critical to high productivity.

Thermal Conductivity -- The property of a material to conduct heat in the form of thermal energy.

Thermocouple -- The junction of two dissimilar metals which has a voltage output proportional to the difference in temperature between the hot junction and the lead wires (cold junction). This term will often be referred to as a “TC” or as “TC’s” throughout this manual.

Thermocouple Processing Unit -- “Thermocouple Processing Unit” and “TPU”, are synonymous with the term “Satellite”, and are used throughout this document. This unit is used to process temperature data from various input sources and send this information to the computer.

TPU – See Thermocouple Processing Unit.

Tool -- An instrument used to perform a task or to display collected data (e.g., graphs, charts, diagrams, questionnaires, etc.).

Total Quality Management -- A systematic customer-focused approach to continuous performance improvement. A philosophy and set of guiding principles which represent the foundation for continuously improving the organization through employee involvement. The application of quantitative methods and human resources to improve the materials and services supplied to and by an organization, all the processes within the organization, and the degree to which the needs of the customer are met. The integration of fundamental management techniques, existing improvement efforts, and technical tools under a disciplined approach to focus on continuous improvement.

Trends – These are patterns in a control chart that feature the continued rise of fall of a series of points. Like Runs, attention should be paid to such patterns when they exceed a predetermined number (statistically based).

Valid Requirements -- Procedures, specifications, plans or policies which meet the needs of the customer(s) and are current, realistic, understandable, measurable, achievable, and compatible with other requirements. When conformed to, valid requirements yield quality.

Value -- Principles or beliefs which are worthwhile and govern the operation of total quality management.

Value Added -- Activities or work essential to ensure a product or service meets the needs of the customer.

Vapor Phase Reflow Soldering -- A type of reflow soldering in which the printed circuit board assembly is passed through a vaporized inert fluorocarbon. The latent heat given up when the fluorocarbon condenses causes the solder to reflow.

Variables – Variables are those characteristics of a part or process which can be measured.

Variation -- Periodic or sporadic changes or deviations within a process and is the inevitable difference among individual outputs of a process; sources of variation can be grouped into two major classes: Common Causes and Special Causes.

Virtual Profiling -- Also referred to as “VP”, this phrase is used to describe the ability of the computer to perpetually monitor the thermal profiles or real product using computer simulation.

Vision -- A clear, positive, forceful statement, usually 25 words or less, describing what the organization wants to be in three to five years or more, expressed in simple specific terms.

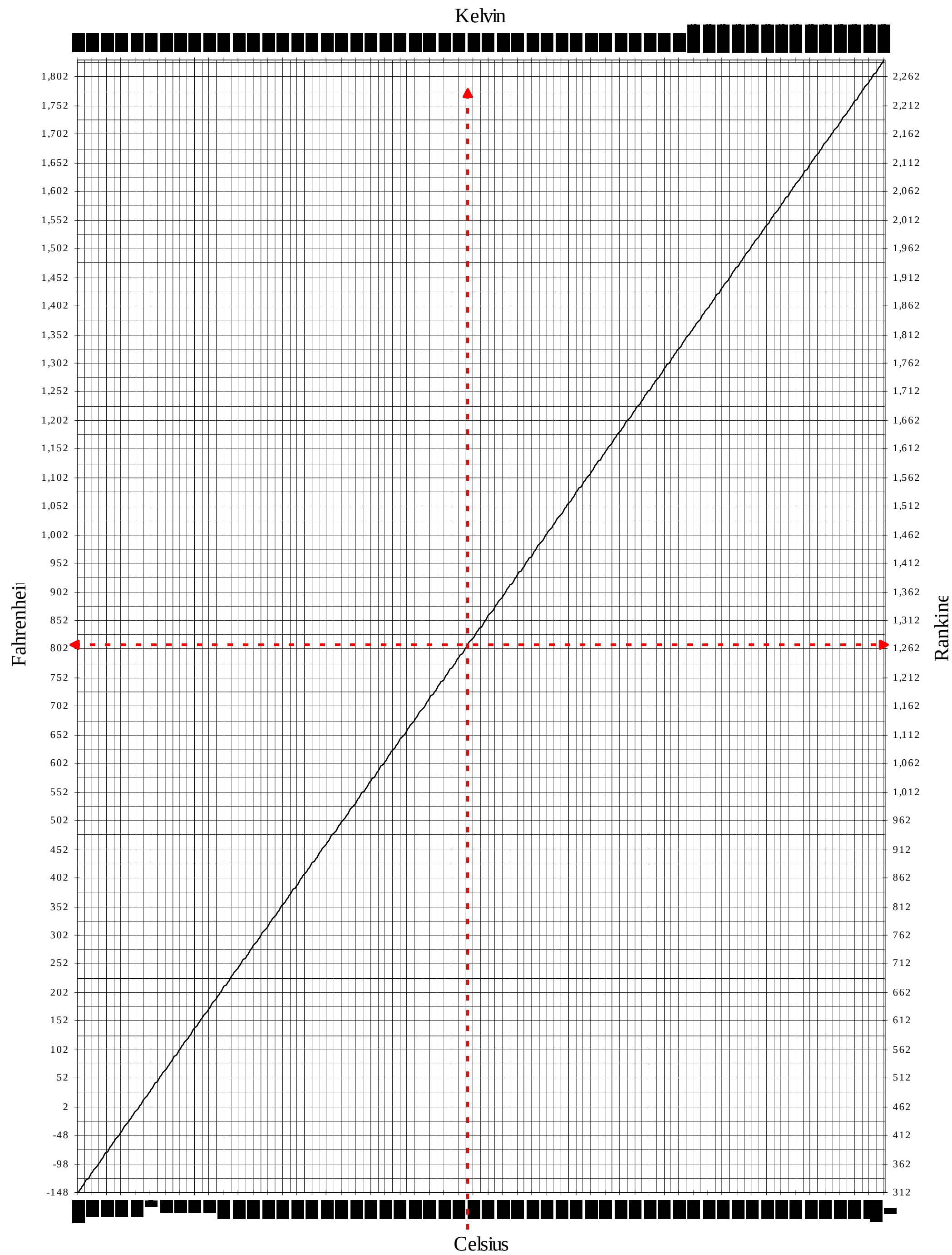
Wetting -- A physical phenomenon of liquids, usually in contact with solids, wherein the surface tension of the liquid has been reduced so that the liquid flows and makes intimate contact in a very thin layer over the entire substrate surface. Regarding wetting of a metal surface by a solder, flux reduces the surface tension of the metal surface and the solder, resulting in the droplets of solder collapsing into a very thin film, spreading and making intimate contact over the entire surface.

Wetting Agent -- A chemical material added to a liquid solution to reduce surface tension. The effect of the reduction of surface tension is to increase the power of the liquid mixture or solution to wet an object on which it is placed.

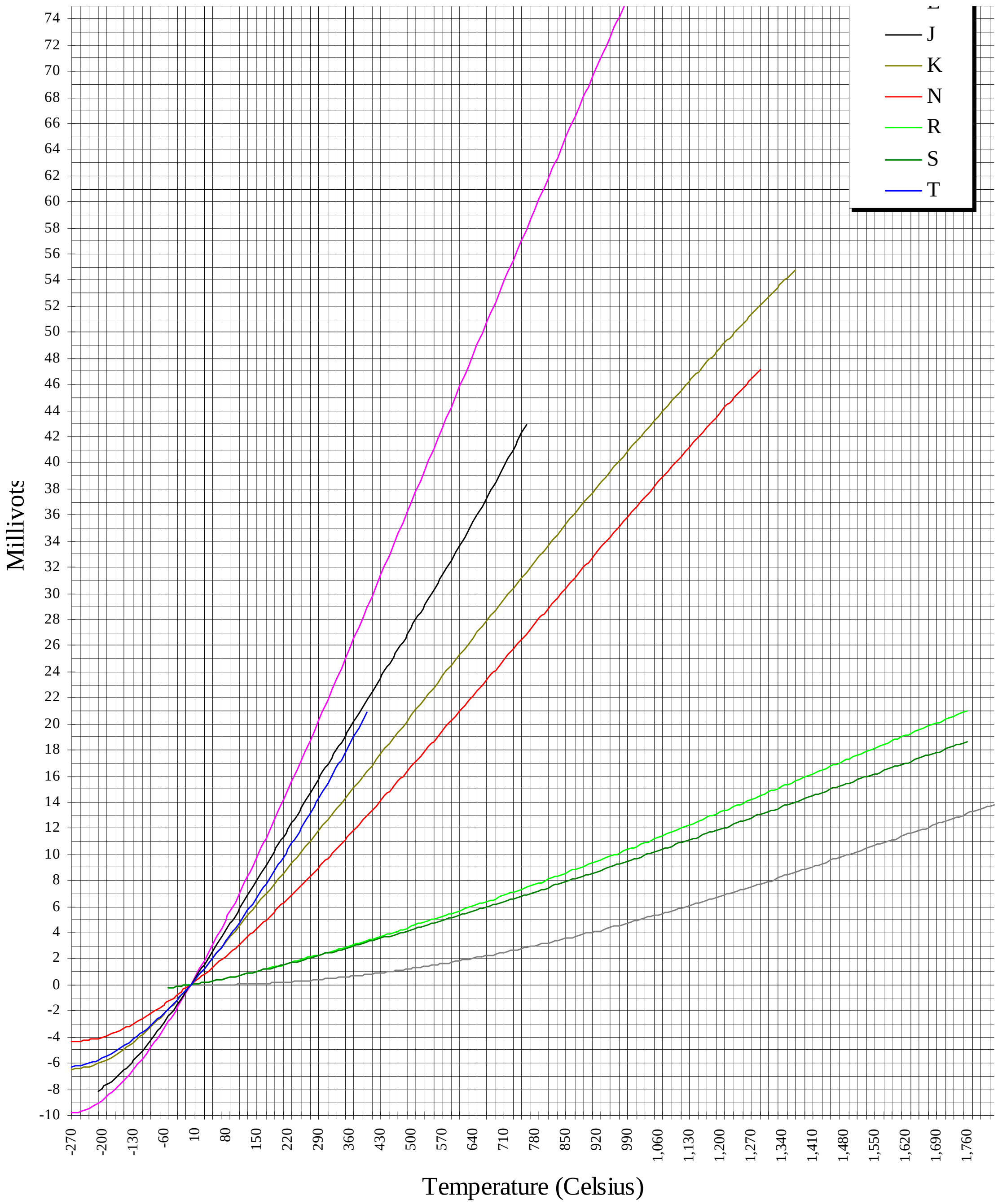
Wicking -- The flow of solder via capillary action along conductors under insulation or through via holes.

APPENDIX E: CHARTS

TEMPERATURE CONVERSION CHART



THERMOCOUPLE OUTPUT CONVERSION CHART



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